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     (FILE 'HOME' ENTERED AT 09:46:05 ON 04 AUG 2004)
               SET COST OFF

     FILE 'HCAPLUS' ENTERED AT 09:46:16 ON 04 AUG 2004
L1             1 S (US20020173024 OR US20020172951)/PN OR (WO2001-US18532 OR US2
               E HORWATH K/AU
L2            14 S E3-E6
               E EASTON C/AU
L3            15 S E3,E14,E17
L4            26 S L2,L3
L5           197 S THERMAL (L) HYSTERESIS (L) ?PROTEIN?
L6            41 S THERMAL (L) HYSTERESIS (L) ?PEPTIDE?
L7          1071 S ANTIFREEZ? (L) ?PROTEIN?
L8           332 S ANTIFREEZ? (L) ?PEPTIDE?
               E THP
L9          5105 S E3
               E AFP
L10         3573 S E3
L11           30 S L9 AND THERMAL (L) HYSTERESIS
L12          350 S L10 AND ANTIFREEZ?
L13         1177 S L5-L8,L11,L12
               E HYSTERESIS/CT
               E E3+ALL
L14          272 S E1 (L) THERMAL
L15           31 S L14 AND (?PROTEIN? OR ?PEPTIDE?)
L16         1177 S L13,L15
               E ANTIFREEZE/CT
               E E5+ALL
L17          667 S E2
L18         1177 S L16,L17
               E ANTIFREEZE/CT
               E E3+ALL
L19           22 S E2,E3 (L) PROTEIN
L20            7 S E2,E3 (L) PEPTIDE
L21           11 S E2,E3 (L) ?PEPTIDE?
L22           41 S E2,E3 (L) ?PROTEIN?
L23         1177 S L18-L22
               E RECRYSTALLIZATION/CT
               E E3+ALL
L24        17276 S E5
               E E4+ALL
L25        76344 S E4
L26           17 S L23 AND L24
L27           21 S L23 AND L25
L28          370 S L23 AND ?CRYS?
L29           73 S L23 AND ?RECRYS?
L30           88 S L26,L27,L29
L31          119 S L23 AND ?CRYO?
               E CRYOPRESERVATION/CT
               E E3+ALL
L32           27 S L23 AND E2
L33           66 S L23 AND (E3+OLD,NT,PFT,RT OR E4+OLD,NT,PFT,RT)
               E ICE/CT
L34            4 S E5 AND L23
               E E3+ALL
L35          132 S L23 AND E3,E2+OLD,NT,PFT
L36          223 S L23 AND (E8+OLD,NT,PFT,RT OR E9+OLD,NT,PFT,RT OR E10+OLD,NT,P
               E FREEZING POINT/CT
L37          118 S L23 AND (E3+OLD,NT,PFT,RT OR E4+OLD,NT,PFT,RT)
               E PRESERVATION/CT
               E E3+ALL
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L38          55 S L23 AND E1+NT
L39         280 S L23 AND (E17+OLD,NT,PFT,RT OR E16+OLD,NT,PFT,RT OR E15+OLD,NT
L40         441 S L30-L39 AND (?PROTEIN? OR ?PEPTIDE?)
L41           9 S L30-L39 AND (PROTEIN? OR PEPTIDE?)/SC,SX
L42         441 S L40,L41
L43         141 S L42 AND SOLUTION
L44          10 S L4 AND L23
L45          10 S L4 AND L5-L23
L46          11 S L4 AND (?FREEZ? OR ?FROZ? OR ?CRYO? OR ?CRYS?)
L47          11 S L1,L44-L46
L48          10 S L47 AND (?PROTEIN? OR ?PEPTIDE?)
L49           1 S L47 AND (PROTEIN? OR PEPTIDE?)/SC,SX
L50          10 S L48,L49
L51           1 S L47 NOT L50
               E TENEBRIO/CT
L52         926 S E4+OLD,NT,PFT,RT
L53        1091 S E3+OLD,NT,PFT,RT
L54        1092 S E3-E7
               E E3+ALL
               E E6+ALL
L55        3162 S E6+NT
L56          32 S L23 AND L52-L55
L57          42 S L23 AND (TENEBRION? OR T MOLITOR OR TENEBRI? MOLITOR)
L58          12 S L42 AND L56,L57
L59           4 S L43 AND L50,L58
L60          21 S L1,L50,L58,L59
L61          29 S L56,L57 NOT L60
L62         476 S L42,L43,L60,L61
L63         476 S L62 AND L1-L62
L64         349 S L63 AND (PD<=20000608 OR PRD<=20000608 OR AD<=20000608)
L65         349 S L64 AND (?PROTEIN? OR ?PEPTIDE?)
L66           6 S L64 AND (PROTEIN? OR PEPTIDE?)/SC,SX
L67         109 S L65,L66 AND SOLUTION
L68         106 S L67 AND (ANTIFREEZ? OR RECRYSTAL?)
L69          48 S L68 AND (INHIBIT? OR PROTECT?)
L70          79 S L67 AND (PROTEIN# OR PEPTIDE# OR POLYPEPTIDE# OR GLYCOPEPTIDE
L71          37 S L69 AND L70
               SEL DN AN 14 26 35
L72          34 S L71 NOT E1-E9
L73          42 S L70 NOT L71
L74          30 S L73 AND ANTIFREEZE PROTEIN
L75          12 S L73 NOT L74
               SEL DN AN 1 2 3 5
L76           8 S L75 NOT E10-E21
L77          11 S L69 NOT L70-L76
               SEL DN AN 1
L78          10 S L77 NOT E22-E24
L79          19 S L67,L68 NOT L69-L78
               SEL DN AN 13 17
L80          17 S L79 NOT E25-E30
L81          75 S L1,L50,L74,L76,L78,L80
L82          75 S L81 AND L1-L81
L83          75 S L82 AND (AFP? OR AFGP? OR THP? OR ANTIFREEZ? OR ANTI FREEZ? O
L84          45 S L82 AND ?CRYS?
L85          75 S L82 AND (HYPOTHER? OR ?PRESERV? OR ?PROTECT? OR INHIBIT? OR P
L86          75 S L82-L85
L87          38 S L56,L57 NOT L86
L88          24 S L87 AND (PD<=20000608 OR PRD<=20000608 OR AD<=20000608)
L89           0 S L87 AND L4
L90          99 S L86,L88
L91          14 S L87 NOT L90

=> fil hcaplus
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FILE 'HCAPLUS' ENTERED AT 10:34:01 ON 04 AUG 2004

FILE COVERS 1907 - 4 Aug 2004 VOL 141 ISS 6
FILE LAST UPDATED: 3 Aug 2004 (20040803/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d 190 bib abs retable tot

L90 ANSWER 1 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:427283 HCAPLUS
DN 139:230977
TI A serendipitous discovery of **antifreeze protein** -specific activity in C-linked **antifreeze glycoprotein** analogs
AU Eniade, Adewale; Purushotham, Madhusudhan; Ben, Robert N.; Wang, J. B.; **Horwath, Kathleen**
CS Department of Chemistry, State University of New York at Binghamton, Binghamton, NY, 13902, USA
SO Cell Biochemistry and Biophysics (2003), 38(2), 115-124
CODEN: CBBIFV; ISSN: 1085-9195
PB Humana Press Inc.
DT Journal
LA English
OS CASREACT 139:230977
AB Structurally diverse carbon-linked (C-linked) analogs of **antifreeze glycoprotein** (**AFGP**) have been prepared via linear or convergent solid phase synthesis. These analogs range in mol. weight from approx 1.5-4.1 KDa and do not possess the β-D-galactose-1,3-α-D-N-acetylgalactosamine carbohydrate moiety or the L-threonine-L-alanine-L-alanine **polypeptide** backbone native to the **AFGP** wild-type. Despite these dramatic structural modifications, the 2.7-KDa and 4.1-KDa analogs possess **antifreeze protein**-specific activity as determined by **recrystn.**-**inhibition** (RI) and **thermal hysteresis** (TH) assays. These analogs are weaker than the wild-type in their activity, but nanoliter osmometry indicates that these compds. are binding to **ice** and affecting a localized f.p. depression. This is the first example of a C-linked **AFGP** analog that possesses TH and RI activity and suggests that the rational design and synthesis of chemical and biol. stable **AFGP** analogs is a feasible and worthwhile endeavor. Given the low degree of TH activity, these compds. may prove useful for the **protection** of cells during **freezing** and thawing cycles.

RETABLE

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Ananthanarayanan, V	1989	7	1	Life Chem Rep	HCAPLUS
Anisuzzaman, A	1988	174	265	Carb Res	HCAPLUS
Arya, P	1998	8	1127	Bioorg Med Chem Lett	HCAPLUS
Baardsnes, J	1999	463	87	FEBS Lett	HCAPLUS
Ben, R	2001	2	161	Chem BioChem	HCAPLUS
Ben, R	1999	11	1759	Org Lett	
Chakrabartty, A	1991	202	1057	Eur J Biochem	HCAPLUS
Chao, H	1997	36	14652	Biochemistry	HCAPLUS
Costanzo, J	1995	9	351	FASEB J	HCAPLUS
Davies, P	1997	7	828	Curr Opin Struct Bio	HCAPLUS
Davies, P	1990	4	2460	FASEB J	HCAPLUS
Eniade, A	2001	12	817	Bioconjugate Chem	HCAPLUS
Eniade, A	2001	2	557	Biomacromolecules	HCAPLUS
Feeney, R	1978	32	191	Adv Protein Chem	HCAPLUS
Feeney, R	1986	15	59	Annu Rev Biophys Che	HCAPLUS
Filira, F	1990	12	41	Int J Biol Macromol	HCAPLUS
Fletcher, G	1999	63	359	Annu Rev Physiol	
Griffith, M	1995	13	375	Biotech Adv	HCAPLUS
Hansen, T	1993	25	3182	Transplant Proc	HCAPLUS
Hayment, A	1998	430	301	FEBS Lett	
Haymet, A	1999	121	941	J Am Chem Soc	HCAPLUS
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Hays, L	1996	93	6835	Proc Natl Acad Sci U	HCAPLUS
Horwath, K	1996	93	419	Eur J Entomol	HCAPLUS
Houston, M	1998	273	11714	J Biol Chem	HCAPLUS
Knight, C	1998	2	55	Cryobiology	
Knight, C	2000	406	249	Nature	HCAPLUS
Komatsu, S	1970	245	2909	J Biol Chem	HCAPLUS
Koushafar, H	1997	66	114	J Surg Oncol	HCAPLUS
Marcaurelle, L	1999	5	1384	Chem Eur J	HCAPLUS
Marron, T	1996	50	9037	Tetrahedron Lett	
Meldal, M	1990		483	J Chem Soc, Chem Com	HCAPLUS
Ramsay, J	1955	32	372	J Sci Instrument	HCAPLUS
Ravishankar, R	1998	120	11297	J Am Chem Soc	HCAPLUS
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Tablin, F	1996	168	305	J Cell Physiol	HCAPLUS
Tomczak, M	2001	1151	255	Biochim Biophys Acta	
Tseng, P	2001	7	585	Chem Eur J	HCAPLUS
Tsuda, T	1996		2779	Chem Commun	HCAPLUS
Wang, J	1998	308	191	Carb Res	HCAPLUS
Weatherman, R	1996	35	3619	Biochemistry	HCAPLUS
Wierbicki, A	2000	1	268	Biomacromolecules	
Wilson, P	1993	14	31	Cryo-Lett	
Woltering, T	1996	50	9033	Tetrahedron Lett	
Zhang, W	1998	273	34806	J Biol Chem	HCAPLUS

L90 ANSWER 2 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:665225 HCAPLUS
DN 137:296776
TI Effective additives for preventing **recrystallization** in **ice**-slurry systems
AU Lu, Shu-Shen; Inada, Takaaki; Yabe, Akira; Zhang, Xu; Grandum, Svein
CS Chemical Engineering Research Institute, South China University of Technology, Peop. Rep. China
SO Proceedings of Symposium on Energy Engineering in the 21st Century, Hong-Kong, China, Jan. 9-13, 2000 (**2000**), Volume 2, 860-865. Editor(s): Cheng, Ping. Publisher: Begell House, Inc., New York, N. Y. CODEN: 69DAS2
DT Conference
LA English
AB In **thermal**-energy-**storage** systems that use **ice**

slurry as the working fluid, the shape and size of the **crystals** must be optimized during the **ice** creation process. Therefore, methods for preventing **ice** from **recrystg.** during long-term **storage**, and long-distance transport should be developed. Here, for use in **ice**-slurry systems, we studied two potential additives in **solution** (concentration of 5 mg/mL), Tween surfactants and Polyvinyl Alc. (PVA), and compared their capability to **inhibit recrystn.** and to **inhibit ice crystal** growth with that of pure water and **antifreeze proteins** (**AFPs**). For Tween, we studied Tween 80, 81, and 85, and for PVA, we studied three different mol. wts. (31000-50000, 89000-98000, and 124000-186000 sep.). The **inhibition** of **ice crystal** growth was determined by optical microscopy, and the **inhibition** of **recrystn.** by the splat cooling method. The results showed that, among the additives studied here, PVA of mol. weight 31000-50000 was relatively more effective in **inhibiting recrystn.** and had better long-term solubility properties, thus making it a potential additive in **ice**-slurry **cold-storage** systems.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Aldrich Chemical Compan	1986			Aldrich Catalog/Hand	
Assender, H	1998	39	4295	Polymer	HCAPLUS
Davies, P	1997	7	828	Current Opinion Stru	HCAPLUS
Fukusako, S	1999			2R Working Party, "F	
Furukawa, Y	1992	61	776	Appl Phys	HCAPLUS
Grandum, S	1999			J Crystal Growth in	
Grandum, S	1997	11	461	J Thermophys HeatTra	HCAPLUS
Knight, C	1988	25	55	Cryobiology	MEDLINE
Knight, C	1995	32	23	Cryobiology	HCAPLUS
Macklin, W	1966	14	847	Phil Mag	HCAPLUS
Smaglik, P	1998	12	4	The Scientist	
Yeh, Y	1996	96	601	Chemical Reviews	HCAPLUS

L90 ANSWER 3 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:409049 HCAPLUS
DN 136:403489
TI Prevention of **ice** nucleation by polyglycerol
IN Fahy, Greg; Wowk, Brian
PA USA
SO U.S. Pat. Appl. Publ., 22 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2002063235	A1	20020530	US 2000-726857	20001130
	US 6616858	B2	20030909		
	US 2003027924	A1	20030206	US 2002-66285	20020201 <--
PRAI	US 1999-167963P	P	19991130	<--	
	US 2000-221691P	P	20000731		
	US 2000-726857	A2	20001130		
	US 2001-916396	A2	20010727		

AB Linear polymers of glycerol can prevent or delay **ice** nucleation in a variety of contexts. Polyglycerol can also be employed in combination with other **ice** control agents, such as polyvinyl alc./polyvinyl acetate copolymers and **antifreeze proteins**, to provide antinucleation effects that are superior to those of either polyglycerol or the coantinucleator alone. Polyglycerol has a number of advantageous phys. and toxicol. properties, such as extreme

water solubility, non-toxicity to human beings, non-toxicity to animal tissues and organs in vitro even at extreme concns., minimal foaming tendency, minimal retention on hydrophobic surfaces, and stability in **soln** . without the need for periodic heating to reactivate its antinucleation properties.

L90 ANSWER 4 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:904220 HCAPLUS
DN 136:49386
TI Cloning of **Tenebrio molitor antifreeze protein** cDNAs, their properties and recombinant expression, and application as **recrystn. inhibition** factors thereof
IN **Horwath, Kathleen L.**; Myers, Kevin L.; **Easton, Christopher M.**
PA The Research Foundation of State University of New York, USA
SO PCT Int. Appl., 363 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001094378	A1	20011213	WO 2001-US18532	20010607 <--
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	US 2002172951	A1	20021121	US 2001-876348	20010607 <--
	US 2002173024	A1	20021121	US 2001-876796	20010607 <--
PRAI	US 2000-210446P	P	20000608 <--		

AB The invention provides **protein** and cDNA sequences for **thermal hysteresis proteins** (**THPs**) or **antifreeze proteins** (**AFPs**) derived from **Tenebrio molitor**, members of **Tenebrionoidea** Type **AFP** Tm12.86 multigene family which lower the f.p. of a **solution** without effecting the m.p. These **proteins** include Tm12.86, Tm2.2, Tm3.4, Tm3.9, Tm7.5, Tm2.3, Tm12.84 and distantly related Tm13.17 (closely related to B1 assessory gland **protein** of **T. molitor**). The invention also discloses essential biochem. and cellular tools that make possible more direct cellular investigations, and an assessment of the relation between **thermal hysteresis protein** (**THP**) levels and **antifreeze** activity (both **thermal hysteresis** and **recrystn. inhibition** [RI]). Related methods for preparing recombinant said **proteins** and for providing **antifreeze** or **recrystn. inhibition** properties to a subject formulation. The purified, expressed **THP protein** can be directly added to an aqueous **solution** to depress the f.p., or transformed organisms expressing **THP** can be added to items which will be stored **frozen.** Also provided is a **recrystn. inhibition** method for determining the presence, relative concentration, and/or activity of **thermal hysteresis proteins** comprising: providing a **proteinaceous** composition in a solvent to form a test **solution**; flash **freezing** said **solution**; raising the temperature of the **frozen solution** to an appropriate annealing temperature that allows for a partial melt, while limiting heterogeneity in **ice** grain sizes within said **solution**; maintaining said **frozen solution** at the

annealing temperature for a length of time sufficient to allow for **recrystn.**; monitoring the **ice crystal** grain size changes over time; and determining the presence of functional **thermal hysteresis proteins** in said **solution** given the retention of significantly smaller **ice crystal** grain sizes relative to at least one control **soln**. These **THP** can be used for new techniques and compns. suitable for improving the **preservation** characteristics of organic materials at low temps., including **storage** of **frozen** foods, plasma, cells, **plants**, etc.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Tomchaney		21	716	Purification Composi	HCAPLUS

L90 ANSWER 5 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:898059 HCAPLUS
DN 136:243920
TI Development of an in vitro fat body cell system for assessing hormonal regulation of **antifreeze protein** production in the beetle, **Tenebrio molitor**
AU **Easton, Christopher M.**
CS State Univ. of New York, Binghamton, NY, USA
SO (2001) 257 pp. Avail.: UMI, Order No. DA3000717
From: Diss. Abstr. Int., B 2001, 62(1), 20
DT Dissertation
LA English
AB Unavailable

L90 ANSWER 6 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:685016 HCAPLUS
DN 136:305672
TI Hyperactive insect **antifreeze protein** from the beetle, **Tenebrio molitor**: from isolation to structure determination
AU Liou, Yih-Cherng
CS Queen's Univ., Kingston, ON, Can.
SO (2000) 172 pp. Avail.: UMI, Order No. DANQ52834
From: Diss. Abstr. Int., B 2001, 61(10), 5298
DT Dissertation
LA English
AB Unavailable

L90 ANSWER 7 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:785024 HCAPLUS
DN 134:39709
TI Developmental and environmental regulation of **antifreeze proteins** in the mealworm beetle **Tenebrio molitor**
AU Graham, Laurie A.; Walker, Virginia K.; Davies, Peter L.
CS Department of Biochemistry, Queen's University, Kingston, ON, K7L 3N6, Can.
SO European Journal of Biochemistry (2000), 267(21), 6452-6458
CODEN: EJBCAI; ISSN: 0014-2956
PB Blackwell Science Ltd.
DT Journal
LA English
AB The yellow mealworm beetle, **Tenebrio molitor**, contains a family of small Cys-rich and Thr-rich **thermal hysteresis proteins** that depress the hemolymph f.p. below the m.p. by as much as 5.5° (ΔT = **thermal hysteresis**). **Thermal hysteresis protein** expression was evaluated throughout development and after

exposure to altered environmental conditions. Under favorable growth conditions, small larvae (11-13 mg) had only low levels of **thermal hysteresis proteins** or **thermal hysteresis protein** message, but these levels increased 10-fold and 18-fold, resp., by the final larval instar (>190 mg), resulting in **thermal hysteresis** >3°. Exposure of small larvae (11-13 mg) to 4 wk of cold (4°) caused an ≈20-fold increase in **thermal hysteresis protein** concentration, well in excess of the less than threefold developmental increase seen after 4 wk at 22°. Exposure of large larvae (100-120 mg) to cold caused 12-fold and sixfold increases in **thermal hysteresis protein** message and **protein** levels, resp., approx. double the maximum levels they would have attained in the final larval instar at 22°. Thus, **thermal hysteresis** increased to similar levels (>4°) in the cold, irresp. of the size of the larvae (the overwintering stage). At pupation, **thermal hysteresis protein** message levels decreased >20-fold and remained low thereafter, but **thermal hysteresis** activity decreased much more slowly. Exposure to cold did not reverse this decline. Desiccation or starvation of larvae had comparable effects to cold exposure, but surprisingly, short daylength photoperiod or total darkness had no effect on either **thermal hysteresis** or message levels. As all environmental conditions that caused increased **thermal hysteresis** also inhibited growth, the authors postulate that developmental arrest is a primary factor in the regulation of **T. molitor thermal hysteresis proteins.**

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Baust, J	1981	27	485	J Insect Physiol	HCAPLUS
Beck, S	1971	64	149	Ann Entomol Soc Am	
Bell, C	1994	30	99	J Stored Prod Res	
Bradford, M	1976	72	248	Anal Biochem	HCAPLUS
Burges, H	1963	54	571	Bull Entomol Res	
Cotton, R	1929	95	1	Techn Bull US Dept A	
Denlinger, D	1991		174	Insects at Low Tempe	
Duman, J	1998	168	225	J Comp Physiol B	HCAPLUS
Ewart, K	1999	55	271	Cell Mol Life Sci	HCAPLUS
Glantz, S	1992			Primer of Biostatist	
Graham, L	1996	18	296	Dev Genet	HCAPLUS
Graham, L	1996	26	127	Insect Biochem Mol B	HCAPLUS
Graham, L	1997	388	727	Nature	HCAPLUS
Han, E	1995	41	981	J Insect Physiol	HCAPLUS
Hodkova, M	1997	34	70	Cryobiology	
Horwath, K	1996	93	419	Eur J Entomol	HCAPLUS
Johnston, S	1990	27	562	Cryobiology	
Kroeker, E	1991	17	169	Arch Insect Biochem	HCAPLUS
Lindgren, D	1955	24	1	Hilgardia	
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Mischke, D	1982	156	449	J Mol Biol	HCAPLUS
Patterson, J	1978	74	37	J Exp Biol	
Ramsey, J	1964	248	279	Phil Trans R Soc Lon	
Tschinkel, W	1971	176	137	J Exp Zool	MEDLINE

L90 ANSWER 8 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:606434 HCAPLUS
DN 133:364125
TI Control of molecular-level **ice crystallization** using **antifreeze protein** and silane coupling agent
AU Inada, T.; Yabe, A.; Grandum, S.; Saito, T.

CS Mechanical Engineering Laboratory, MITI, AIST, Ibaraki, 305-8564, Japan
SO Materials Science & Engineering, A: Structural Materials: Properties, Microstructure and Processing (**2000**), A292(2), 149-154
CODEN: MSAPE3; ISSN: 0921-5093
PB Elsevier Science S.A.
DT Journal
LA English
AB To obtain acceptable **ice**-slurry characteristics for low-temperature energy **storage** and transport systems, methods for preventing **ice recrystn.** must be developed. **Antifreeze proteins** (**AFPs**) are known to be an effective additive in **ice**-slurry systems, making **ice** slurries resistant to **recrystn.**, and thereby improving flowability. However, **AFPs** are expensive and easily degrade. Therefore, we investigated the use of silane coupling agents (SCAs) as substitutes for **AFPs**. To determine the SCA's ability to control **crystallization**, in this study we observed free growth of **ice crystals** in SCA **solns.**, and found that SCAs that form long-chain mols. in water are effective for **crystallization** control. Then we analyzed **ice crystal** surfaces containing **AFPs** and SCAs by using scanning tunneling microscopy (STM) to investigate the mechanism of **crystn**. control with these additives. STM observation of **ice crystal** surfaces showed that the **AFP** mols. are adsorbed onto the **ice crystal** surface on the {2021} planes along the <0112> directions, preventing further **crystal** growth from the site where the **AFP** mols. are adsorbed. Furthermore, we found that long-chain SCA mols. are adsorbed onto **ice crystal** surfaces, preventing **crystal** growth from the site where the long-chain SCA mols. are adsorbed.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Chao, H	1995	357	183	FEBS Lett	HCAPLUS
Chou, K	1992	223	509	J Mol Biol	HCAPLUS
DeVries, A	1969	163	1074	Science	
Feeney, R	1986	15	59	Annu Rev Biophys Bio	HCAPLUS
Grandum, S	1999	205	382	J Crystal Growth	HCAPLUS
Grandum, S	1997	11	461	J Thermophys Heat Tr	HCAPLUS
Jorgensen, H	1993	6	19	Protein Eng	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Knight, C	1993	64	252	Biophys J	HCAPLUS
Lal, M	1993	95	299	Faraday Discuss	HCAPLUS
Madura, J	1994	116	417	J Am Chem Soc	HCAPLUS
McDonald, S	1995	41	959	AIChE J	HCAPLUS
Ogawa, K	1995			Abstract Booklet Eig	
Wen, D	1993	317	31	Federation Eur Bioch	HCAPLUS
Wen, D	1993	268	16401	J Biol Chem	HCAPLUS
Yang, D	1988	333	232	Nature	HCAPLUS

L90 ANSWER 9 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:575875 HCAPLUS
DN 133:183645
TI Adsorption of **antifreeze glucoprotein** (**AFGP**) at **ice**/water interface and its effect for interfacial pattern formation
AU Inohara, Naomi; Furukawa, Yoshinori
CS Inst. Low Temp. Science, Hokkaido Univ., Japan
SO Nippon Kessho Seicho Gakkaishi (**2000**), 27(1), 53
CODEN: NKSGDK; ISSN: 0385-6275
PB Nippon Kessho Seicho Gakkai
DT Journal
LA Japanese

AB The **ice crystal** growth from the **solution** of **AFGP** was observed in situ using the method of unidirectional growth. The serrate pattern, which was consisted by {1010} faces of **ice crystal**, was observed The pattern formation mechanism is discussed in relation to the adsorption properties of **AFGP** at the **ice**/H2O interfaces.

L90 ANSWER 10 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:556413 HCAPLUS
DN 133:277747
TI Mimicry of ice structure by surface hydroxyls and water of a β-helix **antifreeze protein**
AU Liou, Yih-Cherng; Tocilj, Ante; Davies, Peter L.; Jia, Zongchao
CS Department of Biochemistry, Queen's University, Kingston, ON, K7L 3N6, Can.
SO Nature (London) (**2000**), 406(6793), 322-325
CODEN: NATUAS; ISSN: 0028-0836
PB Nature Publishing Group
DT Journal
LA English
AB Insect **antifreeze proteins** (**AFP**) are much more effective than fish **AFPs** at depressing solution f.ps. by ice-growth inhibition. **AFP** from the beetle **Tenebrio molitor** is a small **protein** (8.4 kDa) composed of tandem 12-residue repeats (TCTxSxxCxxAx). Here we report its 1.4-Å resolution crystal structure, showing that this repetitive sequence translates into an exceptionally regular β-helix. Not only are the 12-amino-acid loops almost identical in the backbone, but also the conserved side chains are positioned in essentially identical orientations, making this **AFP** perhaps the most regular **protein** structure yet observed The **protein** has almost no hydrophobic core but is stabilized by numerous disulfide and hydrogen bonds. On the conserved side of the **protein**, threonine-cysteine-threonine motifs are arrayed to form a flat β-sheet, the putative ice-binding surface. The threonine side chains have exactly the same rotameric conformation and the spacing between OH groups is a near-perfect match to the ice lattice. Together with tightly bound co-planar external water, three ranks of oxygen atoms form a two-dimensional array, mimicking an ice section.

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Brunger, A	1998	54	905	Acta Cryst D	
Chen, L	1991	88	4240	Proc Natl Acad Sci U	HCAPLUS
Davies, P	1997	7	828	Curr Opin Struct Bio	HCAPLUS
de La Fortelle, E	1997	276	472	Methods in Enzymolog	HCAPLUS
Duman, J	1998	168	225	J Comp Physiol B	HCAPLUS
Graether, S	2000	406	325	Nature	MEDLINE
Graham, L	1997	388	727	Nature	HCAPLUS
Jenkins, J	1998	122	236	J Struct Biol	HCAPLUS
Jia, Z	1996	384	285	Nature	HCAPLUS
Jones, T	1991	47	110	Acta Cryst A	
Knight, C	1993	64	252	Biophys J	HCAPLUS
Kraulis, P	1991	24	946	J Appl Crystallogr	
Laskowski, R	1993	26	283	J Appl Crystallogr	HCAPLUS
Li, N	1998	37	6343	Biochemistry	HCAPLUS
Liou, Y	2000	56	354	Acta Cryst D	
Liou, Y	1999	38	11415	Biochemistry	HCAPLUS
Liou, Y	2000	19	148	Protein Expr Purif	HCAPLUS
Mayans, O	1997	5	677	Structure	HCAPLUS
Nicholls, A	1991	11	281	Proteins	HCAPLUS
Petersen, T	1997	5	533	Structure	HCAPLUS
Raetz, C	1995	270	997	Science	HCAPLUS

Sheldrick, G	1997	276	319	Methods in Enzymolog	
Sicheri, F	1995	375	427	Nature	HCAPLUS
Steinbacher, S	1994	265	383	Science	HCAPLUS
Tyshenko, M	1997	15	887	Nature Biotechnol	HCAPLUS
Yoder, M	1993	260	1503	Science	HCAPLUS

L90 ANSWER 11 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:406324 HCAPLUS
DN 134:68337
TI Vitrification enhancement by synthetic **ice** blocking agents
AU Wowk, Brian; Leitl, Eugen; Rasch, Christopher M.; Mesbah-Karimi, Nooshin; Harris, Steven B.; Fahy, Gregory M.
CS 21st Century Medicine, Inc., Rancho Cucamonga, CA, 91730, USA
SO Cryobiology (**2000**), 40(3), 228-236
CODEN: CRYBAS; ISSN: 0011-2240
PB Academic Press
DT Journal
LA English
AB Small concns. of the synthetic polymer polyvinyl alc. (PVA) **inhibited** formation of **ice** in water/ **cryoprotectant solns. Ice inhibition** improved with decreasing mol. weight A PVA copolymer of mol. weight 2 kDa consisting of 20% vinyl acetate was particularly effective. PVA copolymer concns. of 0.001, 0.01, 0.1, and 1% weight/weight decreased the concentration of glycerol required to vitrify in a 10-mL volume by 1, 3, 4, and 5% weight/weight, resp. DMSO concns. required for vitrification were also reduced by 1, 2, 2, and 3% weight/weight, resp. **Crystallization** of **ice** on borosilicate glass in contact with **cryoprotectant solns** . was **inhibited** by only 1 ppm of PVA copolymer. Devitrification of ethylene glycol **solns.** was also strongly **inhibited** by PVA copolymer. Visual observation and differential scanning calorimeter data suggest that PVA blocks **ice** primarily by **inhibition** of heterogeneous nucleation. PVA thus appears to preferentially bind and inactivate heterogeneous nucleators and/or nascent **ice crystals** in a manner similar to that of natural **antifreeze proteins** found in **cold**-hardy **fish** and insects. Synthetic PVA-derived **ice** blocking agents can be produced much less expensively than **antifreeze proteins**, offering new opportunities for improving **cryopreservation** by vitrification. (c) 2000 Academic Press.

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Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Caple, G	1983	4	51	Cryo-Lett	HCAPLUS
Carroll, J	1993	48	606	Biol Reprod	HCAPLUS
Chang, Z	1991	12	215	Cryo-Lett	HCAPLUS
Devries, A	1969	163	1074	Science	
Fahy, G				WO PCTUS9604284	
Fahy, G	1996			WO 9630459	HCAPLUS
Fahy, G	1995		315	Biological Ice Nucle	
Fahy, G	1984	21	407	Cryobiology	HCAPLUS
Fahy, G	1990	27	492	Cryobiology	MEDLINE
Fahy, G	1997	24	114	Cryobiology	
Fox, M	1997			"Organic Chemistry,"	
Hey, J	1996	33	205	Cryobiology	HCAPLUS
Hey, J	1998	37	119	Cryobiology	HCAPLUS
Klotz, I	1970		5	The Frozen Cell	HCAPLUS
Naitana, S	1997	48	247	Anim Reprod Sci	HCAPLUS
O'Neil, L	1998	37	59	Cryobiology	HCAPLUS
Palasz, A	1993	30	172	Cryobiology	HCAPLUS

Parody-Morreale, A	1988	333	782	Nature	HCAPLUS
Schmehl, M	1986	23	512	Cryobiology	HCAPLUS
Sommerfeld, V	1999	38	95	Cryobiology	HCAPLUS
Sutton, R	1993	14	13	Cryo-Lett	HCAPLUS
Tomchaney, A	1982	16	716	Biochemistry	
Wilson, P	1995	68	2098	Biophys J	HCAPLUS
Wowk, B	1999	39	280	Cryobiology	

L90 ANSWER 12 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:369350 HCAPLUS
DN 133:161008
TI Folding and structural characterization of highly disulfide-bonded beetle **antifreeze protein** produced in bacteria
AU Liou, Yih-Cherng; Daley, Margaret E.; Graham, Laurie A.; Kay, Cyril M.; Walker, Virginia K.; Sykes, Brian D.; Davies, Peter L.
CS Department of Biochemistry, Queen's University, Kingston, ON, K7L 3N6, Can.
SO Protein Expression and Purification (**2000**), 19(1), 148-157
CODEN: PEXPEJ; ISSN: 1046-5928
PB Academic Press
DT Journal
LA English
AB The hyperactive **antifreeze protein** from the beetle, **Tenebrio molitor**, is an 8.5-kDa, threonine-rich **protein** containing 16 Cys residues, all of which are involved in disulfide bonds. When produced by Escherichia coli, the **protein** accumulated in the supernatant in an inactive, unfolded state. Its correct folding required days or weeks of oxidation at 22 or 4°C, resp., and its purification included the removal of imperfectly folded forms by reversed-phase HPLC. NMR spectroscopy was used to assess the degree of folding of each preparation One-dimensional 1H and two-dimensional 1H total correlation spectroscopy spectra were particularly helpful in establishing the characteristics of the fully folded **antifreeze** in comparison to less well-folded forms. The recombinant **antifreeze** had no free -SH groups and was rapidly and completely inactivated by 10 mM DTT. It had a **thermal hysteresis** activity of 2.5°C at a concentration of 1 mg/mL, whereas fish **antifreeze proteins** typically show a **thermal hysteresis** of .apprx.1.0°C at 10-20 mg/mL. The CD spectra of the beetle **antifreeze** had a superficial resemblance to those of α-helical **proteins**, but deconvolution of the spectra indicated the absence of α-helix and the presence of β-structure and coil. NMR anal. and secondary structure predictions agree with a β-helix model proposed for the **antifreeze** on the basis of its 12-amino-acid repeating structure and presumptive disulfide bond arrangement. (c) 2000 Academic Press.

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Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Braunschweiler, L	1983	53	521	J Magn Reson	HCAPLUS
Chakrabartty, A	1991	202	1057	Eur J Biochem	HCAPLUS
Cheng, C	1999	8	715	Curr Opin Genet Dev	
Cohn, E	1943		157	Proteins, Amino Acid	
Davies, D	1985	107	2820	J Am Chem Soc	
Davies, P	1997	7	828	Curr Opin Struct Bio	HCAPLUS
Duman, J	1998	168	225	J Comp Physiol B	HCAPLUS
Eisenhaber, F	1996	25	157	Struct Funct Design	HCAPLUS
Eisenhaber, F	1996	25	169	Struct Funct Design	HCAPLUS
Ewart, K	1999	55	271	Cell Mol Life Sci	HCAPLUS
Gauthier, S	1998	258	445	Eur J Biochem	HCAPLUS
Graham, L	1997	388	727	Nature	HCAPLUS

Hayes, D	1995			Sedimentation Interp	
Johnson, M	1981	36	575	Biophys J	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Li, N	1998	37	6343	Biochemistry	HCAPLUS
Liou, Y	1999	38	11415	Biochemistry	HCAPLUS
Perczel, A	1992	203	83	Anal Biochem	HCAPLUS
Ramsey, J	1964	248	279	Phil T R Soc B	
Raymond, J	1997	74	2589	Proc Natl Acad Sci	
Sicheri, F	1995	375	427	Nature	HCAPLUS
Tyshenko, M	1997	15	887	Nature Biotechnol	HCAPLUS
Wishart, D	1991	293	72	FEBS Lett	HCAPLUS
Yeh, Y	1996	96	601	Chem Rev	HCAPLUS
Yphantis, D	1991			Nonlinear Least Squa	

L90 ANSWER 13 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:328802 HCAPLUS
TI Simulations of **Tenebrio molitor** in water.
AU Baran, Kelli L.; Madura, Jeffry D.
CS Department of Chemistry & Biochemistry, Duquesne University, Pittsburgh, PA, 15282, USA
SO Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000 (**2000**), CHED-660 Publisher: American Chemical Society, Washington, D. C.
CODEN: 69CLAC
DT Conference; Meeting Abstract
LA English
AB The study of **thermal hysteresis proteins** (**THPs**) has recently gained attention with regards to its interactions at the ice/water interface. Insect **THPs** have unusually high **thermal hysteresis** activity as compared against the **thermal hysteresis** of the fish AFPs, for which there are solved 3-D structures. It is important to determine the 3-D structure of other **THPs** as well so that the interactions between the **THP** and the ice/water interface can be studied to gain insight into the increased **thermal hysteresis.** We are using long term mol. dynamics simulations along with the homol. modeling tools of MOE (Mol. Object Environment by Chemical Computing Group, Inc.) to predict a 3-D structure of the yellow mealworm beetle **Tenebrio molitor** from its primary sequence and exptl. determined disulfide bridges. We will present the results from a 30 ns trajectory of the **Tenebrio molitor** in water.

L90 ANSWER 14 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:239282 HCAPLUS
DN 132:326364
TI Adsorption kinetics in the **solution** of a **thermal hysteresis protein**
AU Li, Q.; Luo, L.
CS Physics Department, Laboratory of Theoretical Physics and Biology, Inner Mongolia University, Hohhot, Peop. Rep. China
SO Chemical Physics Letters (**2000**), 320(3,4), 335-338
CODEN: CHPLBC; ISSN: 0009-2614
PB Elsevier Science B.V.
DT Journal
LA English
AB According to the properties of the interactions between the **thermal hysteresis proteins** (**THPs**) and an **ice crystal** surface in the **THP solution**, the authors present a kinetic theory of the adsorption of **thermal hysteresis proteins** on the **ice crystal** surface. The **thermal hysteresis** activities of the **THP solns.** are given. The cooperative properties in the adsorption process of the **THPs** on

the **ice crystal** surface are discussed.

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Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Burcham, T	1986	261	6390	J Biol Chem	HCAPLUS
Davies, P	1990	4	2460	FASEB J	HCAPLUS
Li, Q	1993	216	453	Chem Phys Lett	HCAPLUS
Li, Q	1994	223	181	Chem Phys Lett	HCAPLUS
Li, Q	1999	30	588	Neimongol	HCAPLUS
Miller, A	1947	43	232	Proc Cambridge Philo	HCAPLUS
Tomchaney, A	1982	21	716	Biochemistry	HCAPLUS
Wilson, P	1995	68	2089	Biophys J	
Yeh, Y	1996	96	601	Chem Rev	HCAPLUS

L90 ANSWER 15 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:190068 HCAPLUS
DN 132:233299
TI Crystallization and preliminary x-ray analysis of insect **antifreeze protein** from the beetle **Tenebrio molitor**
AU Liou, Yih-Cherng; Davies, Peter L.; Jia, Zongchao
CS Department of Biochemistry, Queen's University, Kingston, ON, K7L 3N6, Can.
SO Acta Crystallographica, Section D: Biological Crystallography (**2000**), D56(3), 354-356
CODEN: ABCRE6; ISSN: 0907-4449
PB Munksgaard International Publishers Ltd.
DT Journal
LA English
AB Hyperactive **antifreeze protein** from the beetle **T. molitor** (TmAFP) was produced in Escherichia coli and purified by gel-permeation chromatog. and HPLC. An iodinated derivative was prepared by incubating the 8.5-kDa TmAFP with N-iodosuccinimide. Native and iodinated TmAFP produced 2 different crystal forms when crystallized using the hanging-drop vapor-diffusion technique. The native crystals were rectangular plates that diffracted to .apprx.2.5 Å resolution They were monoclinic and belonged to space group P21, with unit-cell dimensions a = 38.4, b = 73.4, c = 59.3 Å, and β = 97.0°. Crystals of iodinated TmAFP formed elongated hexagons that allowed data to be collected to .apprx.1.4 Å. These crystals belonged to space group P61 (or P65), with unit-cell dimensions a = 73.85, b = 73.85, c = 53.15 Å. There were 2 mols. per asym. unit, which corresponded to Vm = 2.46 Å Da-1 and 51% solvent content. A 2-fold noncrystallog. symmetry was evident from self-rotation calcns.

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Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Crowther, R	1972		173	The Molecular Replac	
Davies, P	1997	7	828	Curr Opin Struct Bio	HCAPLUS
Deng, G	1998	1388	305	Biochim Biophys Acta	HCAPLUS
Duman, J	1998	168	225	J Comput Physiol B	HCAPLUS
Ewart, K	1999	55	271	Cell Mol Life Sci	HCAPLUS
Graether, S	1999	126	72	J Struct Biol	HCAPLUS
Graham, L	1997	388	727	Nature	HCAPLUS
Gronwald, W	1998	37	4712	Biochemistry	HCAPLUS
Jancarik, J	1991	24	409	J Appl Cryst	HCAPLUS
Jia, Z	1996	384	285	Nature	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Li, N	1998	37	6343	Biochemistry	HCAPLUS
Liou, Y	1999	38	11415	Biochemistry	HCAPLUS
Matthews, B	1968	33	491	J Mol Biol	HCAPLUS

Otwinowski, Z	1968	276	307	Methods Enzymol	
Raymond, J	1977	74	2589	Proc Natl Acad Sci U	HCAPLUS
Sicheri, F	1995	375	427	Nature	HCAPLUS
Tyshenko, M	1997	15	887	Nature Biotechnol	HCAPLUS
Yang, D	1998	74	2142	Biophys J	HCAPLUS
Yeh, Y	1996	96	601	Chem Rev	HCAPLUS

L90 ANSWER 16 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:15233 HCAPLUS
DN 132:89240
TI **Protein** and cDNA sequences encoding Myoxocephalus scorpius **antifreeze protein**, and uses thereof in improving the palatability of **cold** foods/liquids and in making cells **cold**-resistant
IN Hew, Choy L.
PA HSC Research and Development Limited Partnership, Can.
SO PCT Int. Appl., 61 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2000000512	A2	20000106	WO 1999-CA601	19990625 <--
WO 2000000512	A3	20000316		
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6429293	B1	20020806	US 1999-344529	19990624 <--
AU 9944941	A1	20000117	AU 1999-44941	19990625 <--
PRAI US 1998-90794P	P	19980626 <--		
US 1998-95713P	P	19980807 <--		
US 1999-344529	A	19990624 <--		
US 1998-90794	P	19980626 <--		
US 1998-95713	P	19980807 <--		
WO 1999-CA601	W	19990625 <--		

AB The invention provides **protein** and cDNA sequences encoding intracellular "sculpin-type" **antifreeze proteins** (**AFPs**) which were isolated from shorthorn sculpin (Myoxocephalus scorpius). The **AFPs** of the present invention are alanine-rich **polypeptides** that are synthesized in the peripheral tissues such as the skin and gills of **fish.** These skin-type **AFPs** are encoded by a distinct set of **AFP** genes that lack a signal **peptide**, which is indicative of their intracellular location. The **AFPs** are used to make cells **cold** resistant and to improve the palatability of **cold** foods and liqs. **Cold** -resistant eukaryotes and prokaryotes, including **plants**, animals and bacteria are made using the disclosed genes/**AFPs.** Moreover, the present invention provides methods for **preserving** cells, tissues and organs ex vivo using the **AFPs** described herein.

L90 ANSWER 17 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:818908 HCAPLUS
DN 132:48231
TI Spruce budworm **antifreeze proteins**, nucleotide and amino acid sequences, and the method of producing recombinant **proteins**

IN Walker, Virginia K.; Davies, Peter L.; Rahavard, Mitra; Tyshenko, Michael G.
PA Queen's University At Kingston, Can.
SO U.S., 27 pp., Cont.-in-part of U.S. Ser. No. 657,264, abandoned.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6008016	A	19991228	US 1997-868594	19970603 <--
	CN 1221450	A	19990630	CN 1997-195223	19970603 <--
	KR 2000016268	A	20000325	KR 1998-709841	19981203 <--
	US 6348569	B1	20020219	US 1999-434323	19991104 <--
PRAI	US 1996-657264	B2	19960603 <--		
	US 1997-868594	A3	19970603 <--		

AB A novel class of **thermal hysteresis**, **antifreeze proteins** (**THPs**) has been isolated and purified from Choristoneura sp., including the eastern spruce budworm C. fumiferana. The amino acid and cloned cDNA sequences for these **antifreeze proteins** and their fragments are reported. The method of producing recombinant **proteins** and expressing them in fungal, yeast, bacteria, **plant**, or **fish** cells is claimed. Polyclonal antibodies reactive to these novel **antifreeze proteins** were raised for detecting **THPs** in western blots and screening a recombinant expression library. The invention also includes a method for decreasing the f.p. of an aqueous **solution** by adding these **antifreeze proteins** to the **soln** . that may be of use in preventing **freeze**/thaw **damage** of **frozen** foods, e.g. **fish.**

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Chakrabartty, A	1991	202	1057	Eur J Biochem	HCAPLUS
Davies, P	1990	4	2460	FASEB J	HCAPLUS
DeVries	1983	45	245	Annu Rev Physiol	HCAPLUS
Duman	1997			US 5627051	HCAPLUS
Duman	1997			US 5633451	HCAPLUS
Duman, J	1983	45	261	Ann Rev Physiol	HCAPLUS
Fourney, R	1984	62	28	Can J Zool	HCAPLUS
Griffith, M	1995	13	375	Biotechnology Advanc	HCAPLUS
Hayes, P	1989	264	18761	The Journal of Biolo	HCAPLUS
Hew, C	1983	61	2324	Can J Zool	HCAPLUS
Lawson	1991	88	9919	Proc Natl Acad Sci	HCAPLUS
Li, X		260	12904	J Biol Chem	HCAPLUS
Ng, N	1986	261	15690	J Biol Chem	HCAPLUS
Ochman, H	1988	120	621	Genetics	HCAPLUS
Patterson	1979	210	361	J Exp Zool	HCAPLUS
Rubin, G	1983	11	6341	Nucl Acids Res	HCAPLUS
Rubin, G	1982	218	348	Science	HCAPLUS
Rubinsky	1994			US 5358931	HCAPLUS
Saiki, R	1985	230	1350	Science	HCAPLUS
Slaughter, D	1981	256	2022	J Biol Chem	HCAPLUS
Tang, W	1994			American Society for	
Thomashow	1994			US 5296462	HCAPLUS
Thomashow	1994			US 5356816	HCAPLUS
Tomchaney, A	1982	21	716	Biochem	HCAPLUS
Warren	1992			US 5118792	HCAPLUS
Wu	1991	161	271	J Comp Physiol B	HCAPLUS
Yin, Y	1996	96	601	Chemical Reviews	

L90 ANSWER 18 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:802390 HCAPLUS
DN 132:162553
TI Further study on the chemical kinetics of **thermal hysteresis protein** activity
AU Li, Qian-zhong
CS Laboratory of Theoretical Physics and Biology, NeiMongol Univ., Hohhot, 010021, Peop. Rep. China
SO Neimenggu Daxue Xuebao, Ziran Kexueban (**1999**), 30(5), 588-591
CODEN: NDZKEJ; ISSN: 1000-1638
PB Neimenggu Daxue Xuebao Bianjibu
DT Journal
LA Chinese
AB According to the properties of the interactions between the **antifreezes** and **ice crystal** surface in **thermal hysteresis protein**, we present the adsorption kinetic theory of the **thermal hysteresis protein** on the **ice crystal** surface. The formula of the expression on activity of **thermal hysteresis protein** is deduced. The **thermal hysteresises** of The **THP solns.** are calculated The cooperative properties in the adsorption process of **thermal hysteresis protein** on **ice crystal** surface are discussed.

L90 ANSWER 19 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:793508 HCAPLUS
DN 132:133767
TI New **ice**-binding face for type I **antifreeze protein**
AU Baardsnes, J.; Kondejewski, L. H.; Hodges, R. S.; Chao, H.; Kay, C.; Davies, P. L.
CS Department of Biochemistry and the Protein Engineering Network of Centres of Excellence, Queen's University, Kingston, ON, Can.
SO FEBS Letters (**1999**), 463(1,2), 87-91
CODEN: FEBLAL; ISSN: 0014-5793
PB Elsevier Science B.V.
DT Journal
LA English
AB Type I **antifreeze protein** (**AFP**) from winter flounder is an alanine-rich, 37 amino acid, single α-helix that contains three 11 amino acid repeats (Thr-X2-Asx-X7), where X is generally Ala. The regularly spaced Thr, Asx and Leu residues lie on one face of the helix and have traditionally been thought to form hydrogen bonds and van der Waals interactions with the **ice** surface. Recently, substitution expts. have called into question the importance of Leu and Asn for **ice**-binding. Sequence alignments of five type I **AFP** isoforms show that Leu and Asn are not well conserved, whereas Ala residues adjacent to the Thr, at right angles to the Leu/Asn-rich face, are completely conserved. To investigate the role of these Ala residues, a series of Ala to Leu steric mutations was made at various points around the helix. All the substituted **peptides** were fully α-helical and remained as monomers in **solution** Wild-type activity was retained in A19L and A20L. A17L, where the substitution lies adjacent to the Thr-rich face, had no detectable **antifreeze** activity. The nearby A21L substitution had 10% wild-type activity and demonstrated weak interactions with the **ice** surface. We propose a new **ice**-binding face for type I **AFP** that encompasses the conserved Ala-rich surface and adjacent Thr.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File

Chakrabartty, A	1991	202	1057	Eur J Biochem	HCAPLUS
Chakrabartty, A	1989	264	11307	J Biol Chem	HCAPLUS
Chao, H	1997	36	14652	Biochemistry	HCAPLUS
Chao, H	1994	3	1760	Protein Sci	HCAPLUS
Chao, H	1996	5	1150	Protein Sci	HCAPLUS
Cheng, A	1997	73	2851	Biophys J	HCAPLUS
Cheng, C	1991		1	Life Under Extreme C	
Chou, K	1992	223	509	J Mol Biol	HCAPLUS
Davies, P	1997	7	828	Curr Opin Struct Bio	HCAPLUS
Davies, P	1982	79	335	Proc Natl Acad Sci	HCAPLUS
DeLuca, C	1998	74	1502	Biophys J	HCAPLUS
DeVries, A	1977	495	388	Biochem Biophys Acta	HCAPLUS
DeVries, A	1970	245	2901	J Biol Chem	HCAPLUS
DeVries, A	1969	163	1073	Science	HCAPLUS
Deng, G	1997	402	17	FEBS Lett	HCAPLUS
Ewart, K	1999	55	271	Cell Mol Life Sci	HCAPLUS
Fourney, R	1984	62	28	Can J Zool	HCAPLUS
Gronwald, W	1996	35	16698	Biochemistry	HCAPLUS
Harding, M	1999	264	653	Eur J Biochem	HCAPLUS
Haymet, A	1998	430	301	FEBS Lett	HCAPLUS
Haymet, A	1999	121	941	J Am Chem Soc	HCAPLUS
Hodges, R	1988	1	19	Pept Res	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Knight, C	1993	64	252	Biophys J	HCAPLUS
Loewen, M	1998	37	17745	Biochemistry	HCAPLUS
Loewen, M	1999	38	4743	Biochemistry	HCAPLUS
Pickett, M	1984	143	35	Eur J Biochem	HCAPLUS
Pickett, M	1984	143	35	Eur J Biochem	HCAPLUS
Scott, G	1987	168	629	Eur J Biochem	HCAPLUS
Sicheri, F	1995	375	427	Nature	HCAPLUS
Wen, D	1992	63	1659	Biophys J	HCAPLUS
Wen, D	1992	267	14102	J Biol Chem	HCAPLUS
Wen, D	1993	268	16396	J Biol Chem	HCAPLUS
Wen, D	1993	268	16401	J Biol Chem	HCAPLUS
Yeh, Y	1996	96	601	Chem Rev	HCAPLUS
Zhang, W	1999	455	372	FEBS Lett	HCAPLUS
Zhang, W	1998	273	34806	J Biol Chem	HCAPLUS

L90 ANSWER 20 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:733923 HCAPLUS
DN 131:333483
TI **Cryo**-bioorganic chemistry. Molecular interactions at low temperature
AU Vajda, T.
CS Department Organic Chemistry, Eotvos Univ., Budapest, H-1518, Hung.
SO Cellular and Molecular Life Sciences (**1999**), 56(5/6), 398-414
CODEN: CMLSFI; ISSN: 1420-682X
PB Birkhaeuser Verlag
DT Journal; General Review
LA English
AB This review with 104 refs. illustrates the differences between **frozen** and liquid conditions on several small and large biomols., together with the synthetic use of **freezing**. **Freezing** of aqueous or organic **solns.** plays a pivotal role in enhancement of rate and/or yield of biomol. reactions. The smooth conditions of the **frozen** state at low temperature can also suppress racemization and side-product formation of the reactions. Mol. interactions in liquid undercooled **solns.**, on the other hand, offer the possibility to study enzyme activity mechanisms in vitro and a chance for survival of organisms in vivo. In relation to the **freezing** effect on enzyme activity, a peculiar phenomenon is discussed: "**cryo** -oscillations" are temporal motions of trypsin activity in **frozen** **solution** in the presence of Mn2+ ion. The mol. basis of **cold**

adaptation is also discussed, which points to mechanisms evolved by organisms living at subzero temps. The factors involved in the **freezing** effect are shown; i.e. the role of **freeze** -concentration and **frozen** solvent surface is demonstrated and elucidated using several examples.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Akerlof, G	1936	58	1241	J Am Chem Soc	HCAPLUS
Alber, T	1976	263	279	Nature	
Baek, H	1992	114	718	J Am Chem Soc	HCAPLUS
Balls, A	1938	3	57	Food Res	HCAPLUS
Barman, T	1986	68	1041	Biochim	HCAPLUS
Batyuk, A	1990		18	Kriobiologija	HCAPLUS
Bazsa, G	1995	57	73	J Inorg Biochem	HCAPLUS
Bruice, T	1964	86	4104	J Am Chem Soc	HCAPLUS
Chao, H	1995	357	183	FEBS Lett	HCAPLUS
Cheng, A	1997	73	2851	Biophys J	HCAPLUS
Concannon, J	1986	43	3027	Am J Hosp Pharm	HCAPLUS
Diehl, H	1933	5	300	Food Indus	HCAPLUS
Dinel, B	1977	11	542	Drug Intell Clin Pha	HCAPLUS
Douzou, P	1979	12	521	Quart Rev Biophys	HCAPLUS
Eigen, M	1958	247	505	Proc Roy Soc Lond A	
Feller, G	1997	53	830	Cell Mol Life Sci	HCAPLUS
Feller, G	1996	18	189	FEMS Microbiol Rev	HCAPLUS
Fennema, O	1975		397	Water Relations of F	HCAPLUS
Fennema, O	1975		539	Water Relations of F	HCAPLUS
Field, R	1984			Oscillations and Tra	
Fink, A	1976	263	294	Nature	HCAPLUS
Fletcher, G	1998		239	Cold Ocean Physiolog	HCAPLUS
Franck, F	1975	9	137	Proc Faraday Symp Ch	
Franks, F	1995	46	106	Advances in Protein	
Franks, F	1985			Biophysics and Bioch	
Frauenfelder, H	1979	280	558	Nature	HCAPLUS
Goldbeter, A	1976	5	449	Annu Rev Biophys Bio	HCAPLUS
Goldbeter, A	1997			Biochemical Oscillat	
Grant, N	1967	118	292	Arch Biochem Biophys	HCAPLUS
Grant, N	1965	4	1913	Biochemistry	HCAPLUS
Grant, N	1961	83	4476	J Am Chem Soc	HCAPLUS
Grant, N	1962	84	876	J Am Chem Soc	HCAPLUS
Grant, N	1966	88	4071	J Am Chem Soc	HCAPLUS
Grant, N	1966	212	194	Nature	MEDLINE
Grant, N	1965	150	1589	Science	HCAPLUS
Griffith, M	1992	100	593	Plant Physiol	HCAPLUS
Gronwald, W	1996	35	16698	Biochemistry	HCAPLUS
Hansler, M	1996	11	379	Amino Acids	
Hansler, M	1996	2	279	J Peptide Sci	MEDLINE
Harris, J	1992			Poly(-ethylene glyco	
Hatley, R	1986	24	187	Biophys Chem	HCAPLUS
Hervagault, J	1983	131	183	Eur J Biochem	HCAPLUS
Hess, B	1978		409	Frontiers in Physico	HCAPLUS
Hess, B	1997	30	121	Q Rev Biophys	HCAPLUS
Hess, B	1987	12	45	Trends Biochem Sci	HCAPLUS
Hew, C	1992	203	33	Eur J Biochem	HCAPLUS
Hill, J	1991	192	358	Anal Biochem	HCAPLUS
Huber, R	1978	11	114	Acc Chem Res	HCAPLUS
Jakubke, H	1996		53	Molecular Design and	HCAPLUS
Jia, Z	1996	384	285	Nature	HCAPLUS
Kavanau, J	1964		2	Water and Solute Wat	
Landolt-Bornstein	1959	2		Elektrische Eigensch	
Laursen, R	1994	116	12057	J Am Chem Soc	HCAPLUS
Lineweaver, H	1939	61	403	J Am Chem Soc	HCAPLUS

Littlemore, L	1993		185	Peptide Chemistry, P	HCAPLUS
Liu, R	1997	119	4791	J Am Chem Soc	HCAPLUS
Liu, R	1998	28	245	Origins Life Evol Bi	HCAPLUS
Liu, R	1998	28	47	Origins Life Evol Bi	HCAPLUS
Loach, P	1970		33	CRC Handbook of Bioc	
Lozano, P	1994	33	91	Biochem Mol Biol Int	HCAPLUS
Mandelbrot, B	1983			The Fractal Geometry	
Mathias, S	1991	9	370	Trends Biotechnol	MEDLINE
Meryman, T	1966			Cryobiology	
Michelson, A	1978		318	Frontiers in Physico	
Nicolis, G	1977			Self-Organization in	
Nilsson, K	1992	16	182	Biotechnol Appl Bioc	HCAPLUS
Ozaki, S	1998	120	8020	J Am Chem Soc	HCAPLUS
Pincock, R	1969	2	97	Acc Chem Res	HCAPLUS
Pincock, R	1966	88	4455	J Am Chem Soc	HCAPLUS
Reichardt, C	1994	94	2319	Chem Rev	HCAPLUS
Reichardt, C	1988			Solvents and Solvent	
Rey, L	1975	191	9	Proc R Soc Lond B	MEDLINE
Russell, N	1992		203	Molecular Biology an	HCAPLUS
Schuster, M	1990	46	8093	Tetrahedron	HCAPLUS
Sergeev, B	1990	35	566	Cryochemistry - new	
Shija, R	1992	80	203	Int J Pharm	HCAPLUS
Sicheri, F	1995	375	427	Nature	HCAPLUS
Sizer, I	1942	7	201	Food Res	HCAPLUS
Strambini, G	1996	70	971	Biophys J	HCAPLUS
Tanner, J	1996	35	2597	Biochemistry	HCAPLUS
Thompson, L	1971	19	121	J Agr Food Chem	HCAPLUS
Tougu, V	1995	1247	272	Biochim Biophys Acta	HCAPLUS
Ullmann, G	1997	1338	253	Biochim Biophys Acta	HCAPLUS
Vajda, T	1980	92	1397	Biochem Biophys Res	HCAPLUS
Vajda, T	1986	7	23	Cryo-Lett	HCAPLUS
Vajda, T	1995	16	339	Cryo-Lett	HCAPLUS
Vajda, T	1996	17	295	Cryo-Lett	HCAPLUS
Vajda, T	1998	19	361	Cryo-Lett	HCAPLUS
Vajda, T	1993	25	1015	Ind J Chem Kinet	HCAPLUS
Vajda, T	1988	20	661	Int J Chem Kinet	HCAPLUS
Vajda, T	1987	29	49	J Inorg Biochem	HCAPLUS
Vajda, T	1993	52	131	J Inorg Biochem	HCAPLUS
Vajda, T	1995	57	77	J Inorg Biochem	HCAPLUS
Vajda, T	1981	15	307	J Inorg Chem	HCAPLUS
Vajda, T	1998	4	300	J Peptide Sci	HCAPLUS
Warren, G	1995		85	Biol Ice Nucl Its Ap	HCAPLUS
Wen, D	1993	317	31	FEBS Lett	HCAPLUS
Wharton, D	1998	36	279	Cryobiology	
Williams-Smith, D	1977	167	593	Biochem J	HCAPLUS
Winfree, A	1984	61	661	J Chem Educ	
Wohlfarth, C	1994		155	CRC Handbook of Chem	
Woller, P	1993	34	203	Adv Microb Physiol	
Yang, D	1998	74	2142	Biophys J	HCAPLUS
Yeh, Y	1996	96	601	Chem Rev	HCAPLUS

L90 ANSWER 21 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:705353 HCAPLUS
TI The capacity for supercooling as a criterion of cold tolerance at various developmental stages of yellow mealworm, beetle **Tenebrio molitor**
AU Belous, A. M.; Gulevskii, A. K.; Ryazantsev, V. V.; Zinchenko, A. V.; Relina, L. I.
CS Inst. Probl. Krivobiol. i Kriomed., NAN Ukrainy, Kharkov, Ukraine
SO Dopovidi Natsional'noi Akademii Nauk Ukraini (**1999**), (8), 145-148
CODEN: DNAUFL; ISSN: 1025-6415
PB Prezidiya Natsional'noi Akademii Nauk Ukraini

DT Journal
LA Russian
AB The capacity for supercooling in different developmental stages of freeze-avoiding beetle **Tenebrio molitor** is investigated. All the investigated stages (Larvae, pupae, and adults) are found to be able to supercool. This capacity is shown to increase in larvae and adults after preliminary acclimation at subzero temps. These changes are likely to be due to accumulation of **antifreeze proteins.** The crystallization temperature in acclimated larvae is 7.5°C lower than in control and in acclimated adults is 3.5°C lower. At the same time, supercooling is a necessary but not sufficient criterion of cold tolerance, as a part of insects perishes from cold shock injuring factors. Protecting mechanisms lowering the possibility of lethal anomalies are switched on during cold acclimation.

L90 ANSWER 22 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:606290 HCAPLUS
DN 131:201672
TI Analysis of **ice crystal** growth for a **crystal** surface containing adsorbed **antifreeze proteins**
AU Grandum, Svein; Yabe, Akira; Nakagomi, Kazuya; Tanaka, Makoto; Takemura, Fumio; Kobayashi, Yasunori; Frivik, Per-Erling
CS Institute for Energy Technology, Kjeller, 2027, Norway
SO Journal of Crystal Growth (**1999**), 205(3), 382-390
CODEN: JCRGAE; ISSN: 0022-0248
PB Elsevier Science B.V.
DT Journal
LA English
AB The adsorption of **antifreeze protein** (**AFP**) mols. to the **ice crystal** surface during melt growth from an **AFP solution** results in disturbance of the growth kinetics at the surface interface. In this paper, the growth pattern related to the potential for **crystal** growth as well as the **crystal** surface topog. have been studied. The **crystal** shape and size were strongly dependent on the supercooling in the **crystal**'s surrounding liquid In between a transition temperature and the **freezing** temperature, needle-type **crystals** were formed, growing rapidly in the c-axis direction. The surface was investigated by using a scanning tunneling microscope (STM) and a systematic groove/ridge pattern aligned 65° (± 5°) to the hexagonal side on one bipyramidal plane observed with length and width similar to the size of the **AFP** mol. The depth of the grooves, ranging from 2-10 nm indicates the curvature of **ice.**

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Chao, H	1995	357	183	FEBS Lett	HCAPLUS
Chou, K	1992	223	509	J Mol Biol	HCAPLUS
Coger, R	1992	205	37	Am Soc Mech Eng HTD	HCAPLUS
Devries, A	1977	495	388	Biophys Acta	HCAPLUS
Grandum, S	1997	11	461	J Thermophys Heat Tr	HCAPLUS
Israelachvili, J	1985			Intermolecular and S	
Jorgensen, H	1993	6	19	Prot Eng	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Knight, C	1993	64	252	Biophys J	HCAPLUS
Lal, M	1993	95	299	Faraday Discuss	HCAPLUS
Madura, J	1994	116	417	J Am Chem Soc	HCAPLUS
McDonald, S	1995	41	959	A I Ch E J	HCAPLUS
Mori, A	1996	65	2742	J Phys Soc Japan	HCAPLUS
Ogawa, K				Eighth International	
Sicheri, F	1995	375	427	Nature	HCAPLUS
Wen, D	1993	317	31	Fed Euro Biochem Soc	HCAPLUS

Wen, D	1993	268	16401	J Biol Chem	HCAPLUS
Yabe, A	1996	7	193	Ann Rev Heat Transfe	HCAPLUS
Yang, D	1988	333	232	Nature	HCAPLUS

L90 ANSWER 23 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:586578 HCAPLUS
DN 132:90645
TI **Antifreeze proteins** and their role in plant **antifreeze** physiology
AU Jiang, Yong; Jia, Shi-Rong; Fei, Yun-Biao; Tan, Ke-Hui
CS Biotechnology Research Center, Chinese Academy of Agricultural Sciences, Beijing, 100081, Peop. Rep. China
SO Zhiwu Xuebao (**1999**), 41(7), 677-685
CODEN: CHWHAY; ISSN: 0577-7496
PB Kexue Chubanshe
DT Journal; General Review
LA Chinese
AB A review with 85 refs. on the structure, function, and action mechanism of the **antifreeze proteins.** In the last 3 decades, **antifreeze proteins** (**AFPs**) have been studied in overwintering insects, polar fish, then in plant materials. The studies in fish **AFPs** were more comprehensive and systematic. Four groups of **AFPs** are identified in the polar fish: AFGPs (**antifreeze glycoproteins**), **AFP** I, **AFP** II and **AFP** III. Two new **AFPs**, THP26/27 (in **Tenebrio molitor**), DAFP-1/-2 (in Dendroides canadensis), are purified from insects. Recently, five **AFPs** in plants are purified: Sd67 (in Solanum dulcamara), three antifungal **proteins** (in Secale cereale) and **afp** (in Ammonpiptanthus mongolicus). Their THA (**thermal hysteresis** activity) is lower than that of fish and insect **AFPs.** Plant **AFPs** may have four functions in the **antifreeze** process of plant: (1) lowering the f.p.; (2) inhibiting ice-recrystn.; (3) modifying ice morphol.; (4) regulating the supercooling state of protoplasm. And it is the last one that may be the key role of **AFPs** to beneficiate the plant undergoing an **antifreeze** physiol. process.

L90 ANSWER 24 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:579883 HCAPLUS
DN 131:189478
TI Purification of highly active **anti-frozen protein** from **plants**
IN Fei, Yunbiao; Sun, Longhua; Huang, Tao; Shu, Nianhong; Gao, Sujing; Zhao, Shuhui; Jian, Lingcheng
PA Institute of Developmental Biology, Chinese Academy of Sciences, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 18 pp.
CODEN: CNXXEV
DT Patent
LA Chinese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI CN 1117497	A	19960228	CN 1994-115012	19940824 <--
PRAI CN 1994-115012		19940824 <--		

AB The title **protein** for use as **anti-frozen** agent or cosmetic or food additive is separated from a **cold** -resistant **plant** by homogenizing with a **solution** containing Tris-HCl 1.5-3.0 mM, KCl 0.1 M, EDTA 0.1 mM, mercaptoethanol 5 mM, and PMSF 1 mM, treating with ammonium chloride to obtain a supernatant and purifying on DE-52 and Sephadex G100 columns.

L90 ANSWER 25 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:503159 HCAPLUS
DN 131:282885
TI A Complex Family of Highly Heterogeneous and Internally Repetitive Hyperactive **Antifreeze Proteins** from the Beetle **Tenebrio molitor**
AU Liou, Yih-Cherng; Thibault, Pierre; Walker, Virginia K.; Davies, Peter L.; Graham, Laurie A.
CS Departments of Biochemistry and Biology, Queen's University, Kingston, ON, K7L 1N6, Can.
SO Biochemistry (**1999**), 38(35), 11415-11424
CODEN: BICHAW; ISSN: 0006-2960
PB American Chemical Society
DT Journal
LA English
AB The authors have previously identified a Thr- and Cys-rich **thermal hysteresis** (**antifreeze**) **protein** (**THP**) in the beetle **Tenebrio molitor** that has 10-100 times the f.p. depression activity of fish **antifreeze proteins**. Because this 8.4 kDa **protein** is significantly different in its properties from **THP** prepns. previously reported from this insect, a thorough search was undertaken for other **antifreeze** types. Many active **proteins** were observed, but all appeared to be isoforms of the **THP** that differed in their number of 12-amino acid repeats (consensus sequence CTxSxxCxxAxT), amino acid substitutions, and N-linked glycosylation. Mass spectral anal. has matched most of these isoforms with cDNA sequences of 17 different clones from a larval fat body library that encode eight different mature **THPs** containing 84, 96, or 120 amino acids. Genomic Southern blots suggest there may be 30-50 tightly linked copies of the gene, which is a signature consistently seen with unrelated fish **antifreeze protein** genes, and one that has been associated with the need to rapidly increase gene product in response to climate change. A three-dimensional model is proposed for the fully disulfide-bonded structure of **T. molitor** **THP**, which can accommodate addition or deletion of 12-amino acid repeats. The structure is a β-helix that places most of the Thr in a regular array on one side of the **protein** to form a putative ice-binding surface.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
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Ashburner, M	1989			Drosophila:A Laborat	
Bateman, K	1998	794	327	J Chromatogr A	HCAPLUS
Bjellqvist, B	1994	15	529	Electrophoresis	HCAPLUS
Burcham, T	1986	261	6384	J Biol Chem	HCAPLUS
Chakrabartty, A	1991	202	1057	Eur J Biochem	HCAPLUS
Chao, H	1994	3	1760	Protein Sci	HCAPLUS
Chao, H	1996	5	1150	Protein Sci	HCAPLUS
Chen, L	1997	94	3811	Proc Natl Acad Sci U	HCAPLUS
Cotton, R	1929	95	1	Tech Bull U.S Dep Ag	
Davies, P	1997	7	828	Curr Opin Struct Bio	HCAPLUS
Duman, J	1998	168	225	J Comp Physiol B	HCAPLUS
Gourlie, B	1984	259	14960	J Biol Chem	HCAPLUS
Graham, L	1996	18	296	Dev Genet	HCAPLUS
Graham, L	1996	26	127	Insect Biochem Mol	HCAPLUS
Graham, L	1997	388	727	Nature	HCAPLUS
Grimstone, A	1968	253	343	Philos Trans R Soc L	
Hansen, T	1988	957	217	Biochim Biophys Acta	HCAPLUS
Hayes, P	1989	264	18761	J Biol Chem	HCAPLUS
Hew, C	1988	263	12049	J Biol Chem	HCAPLUS
Horwath, K	1996	93	419	Eur J Entomol	HCAPLUS
Johnston, S	1990	27	562	Cryobiology	

Klug, A	1995	9	597	FASEB J	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Kroeker, E	1989			Ph.D Thesis, Queen's	
Kubelka, V	1994	308	148	Arch Biochem Biophys	MEDLINE
Lee, M	1990	10	4506	Mol Cell Biol	HCAPLUS
Li, N	1998	37	6343	Biochemistry	HCAPLUS
Li, N	1998	201	2243	J Exp Biol	HCAPLUS
Morris, H	1996	10	889	Rapid Commun Mass Sp	HCAPLUS
Patterson, J	1978	74	37	J Exp Biol	
Patterson, J	1979	210	361	J Exp Zool	HCAPLUS
Patterson, J	1982	219	381	J Exp Zool	HCAPLUS
Pohl, T	1991	88	10059	Proc Natl Acad Sci U	HCAPLUS
Ramsey, J	1964	248	279	Philos Trans R Soc L	
Schneppenheim, R	1980	67	561	Comp Biochem Phys B	
Scott, G	1986	43	1028	Can J Fish Aquat Sci	
Scott, G	1988	27	29	J Mol Evol	HCAPLUS
Scott, G	1988	8	3670	Mol Cell Biol	HCAPLUS
Scott, G	1985	82	2613	Proc Natl Acad Sci	HCAPLUS
Sonnichsen, F	1995	4	460	Protein Sci	HCAPLUS
Tang, W	1993			Ph.D Thesis, State U	
Tomchaney, A	1982	21	716	Biochemistry	HCAPLUS
Tyshenko, M	1997	15	887	Nat Biotechnol	HCAPLUS
Von Heijne, G	1986	14	4683	Nucleic Acids Res	HCAPLUS
Worrall, D	1998	282	115	Science	HCAPLUS

L90 ANSWER 26 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:485334 HCAPLUS
DN 131:177541
TI Driving force for **ice crystal** growth from **AFGP solution**
AU Inohara, N.; Furukawa, Y.
CS Inst. Low Temp. Sci., Hokkaido Univ., Japan
SO Nippon Kessho Seicho Gakkaishi (**1999**), 26(2), 147
CODEN: NKSGDK; ISSN: 0385-6275
PB Nippon Kessho Seicho Gakkai
DT Journal
LA Japanese
AB **Ice crystal** growth from the **AFGP solution** was observed in-situ using a directional growth method. Driving force for the **ice crystal** grown in **AFGP solution** was directly measured.

L90 ANSWER 27 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:369664 HCAPLUS
DN 131:154985
TI Purification, immunolocalization, **cryoprotective**, and **antifreeze** activity of PCA60: a dehydrin from peach (Prunus persica)
AU Wisniewski, Michael; Webb, Robert; Balsamo, Ron; Close, Timothy J.; Yu, Xiao-Ming; Griffith, Marilyn
CS USDA-ARS, Kearneysville, WV, 25430, USA
SO Physiologia Plantarum (**1999**), 105(4), 600-608
CODEN: PHPLAI; ISSN: 0031-9317
PB Munksgaard International Publishers Ltd.
DT Journal
LA English
AB Dehydrins are glycine-rich, hydrophilic, **heat**-stable **proteins** and are generally induced in response to a wide array of environmental stresses. In previous research, a full-length dehydrin gene, ppdhn1, was isolated from peach, and its expression was associated with qual. and quant. differences in **cold** hardiness in sibling genotypes of evergreen and deciduous peach. Similar results were obtained for levels of the corresponding 60 kDa peach dehydrin **protein**

(PCA60). The objective of the present study was to purify the PCA60, test the purified **protein** for **cryoprotective** and/or **antifreeze** activity, and to determine the cellular localization of PCA60 using immuno-microscopy. PCA60 was extracted from winter bark tissues of peach (Prunus persica |L.| Batsch) and purified in a two-step process. Separation was based on free-**solution** isoelec. focusing followed by size exclusion. Purified PCA60, as well as crude **protein** extract, **preserved** the in vitro enzymic activity of lactate dehydrogenase after several **freeze**-thaw cycles in liquid nitrogen. PCA also exhibited distinct **antifreeze** activity as evidenced by **ice crystal** morphol. and **thermal hysteresis**. This is the first time **antifreeze** activity has been demonstrated for dehydrins. Immuno-microscopy, utilizing an affinity-purified, polyclonal antibody developed against a synthetic **peptide** of the lysine-rich consensus portion of dehydrins, indicated that PCA60 was freely distributed in the cytoplasm, plastids, and nucleus of bark cells and xylem parenchyma cells. Although the functional role of dehydrins remains speculative, the data support the hypothesis that it plays a role in preventing denaturation of **proteins** exposed to dehydrative stresses.

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Artlip, T	1997	122	784	J Am Soc Hort Sci	
Artlip, T	1997	33	61	Plant Mol Biol	HCAPLUS
Artus, N	1996	93	13404	Proc Natl Acad Sci U	HCAPLUS
Asghar, R	1994	177	87	Protoplasma	HCAPLUS
Cai, Q	1995	29	11	Plant Mol Biol	HCAPLUS
Campbell, S	1997	137	61	New Phytol	HCAPLUS
Caple, G	1996	11	299	J Colloid Interf Sci	
Carpenter, J	1988	25	244	Cryobiology	HCAPLUS
Ceccardi, T	1994	5	266	Protein Exp Purif	HCAPLUS
Close, T	1996	97	795	Physiol Plant	HCAPLUS
Close, T	1997	100	291	Physiol Plant	HCAPLUS
Close, T	1993	23	279	Plant Mol Biol	HCAPLUS
Danyluk, J	1998	10	623	Plant Cell	HCAPLUS
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Godoy, J	1994	26	1921	Plant Mol Biol	HCAPLUS
Gong, Z	1996	271	4106	J Biol Chem	HCAPLUS
Hew, C	1992	203	33	Eur J Biochem	HCAPLUS
Hon, W	1994	104	271	Plant Physiol	
Hon, W	1995	109	879	Plant Physiol	HCAPLUS
Houde, M	1995	8	583	Plant J	HCAPLUS
Kazuuoka, T	1994	35	601	Plant Cell Physiol	
Lin, C	1992	183	1103	Biochem Biophys Res	HCAPLUS
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Muthalif, M	1994	104	1439	Plant Physiol	HCAPLUS
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Pihakaski-Maunsbach, K	1996	191	115	Protoplasma	HCAPLUS
Ramagl, L	1985	6	559	Electrophoresis	
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Wisniewski, M	1995	9	253	Trees
Zamecnik, J	1992	29	718	Cryobiology

L90 ANSWER 28 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:217462 HCAPLUS
DN 131:128417
TI An in Vivo Study of **Antifreeze Protein** Adjuvant **Cryosurgery**
AU Pham, Linda; Dahiya, Rajvir; Rubinsky, Boris
CS Bioengineering Laboratory, Department of Mechanical Engineering, University of California, Berkeley, CA, 94720, USA
SO Cryobiology (**1999**), 38(2), 169-175
CODEN: CRYBAS; ISSN: 0011-2240
PB Academic Press
DT Journal
LA English
AB **Cryosurgery** employs **freezing** to destroy undesirable tissue. However, under certain **thermal** conditions, **frozen** tissues survive. The survival of **frozen** undesirable tissue may lead to complications, such as recurrence of cancer. In a study of nude mice with s.c. metastatic prostate tumors, we showed that the preoperative injection of a phosphate-buffered saline **solution** with 10 mg/mL **antifreeze protein** of type I into the tumor prior to **freezing** enhances destruction under **thermal** conditions which normally yield cell survival. This suggests that the adjunctive use of **antifreeze proteins** in **cryosurgery** may reduce the complications from undesirable tissues that survive **freezing.** (c) 1999 Academic Press.

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Cooper, T	1970	7	189	Cryobiology	
Koushafar, H	1997	49	421	Urology	MEDLINE
Koushafar, S	1997	66	114	J Surg Oncol	
Mazur, P	1970	168	939	Science	MEDLINE
Onik, G	1984	21	321	Cryobiology	MEDLINE
Rubinsky, B	1984	21	303	Cryobiology	MEDLINE
Rubinsky, B	1989	26	580	Cryobiology	
Rubinsky, B	1993	30	191	Cryobiology	MEDLINE
Rubinsky, B	1986	108	48	Mech Eng	
Sicheri, F	1995	375	427	Nature	HCAPLUS
Tatsutani, K	1996	48	441	Urology	MEDLINE
Yeh, Y	1996	96	601	Chem Rev	HCAPLUS

L90 ANSWER 29 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:34995 HCAPLUS
DN 130:120468
TI Properties and uses of **Tenebrio molitor thermal hysteresis (antifreeze) proteins (THP)**
IN Graham, Laurie A.; Liou, Yih-cherng; Walker, Virginia K.; Davies, Peter L.
PA Queen's University At Kingston, Can.
SO PCT Int. Appl., 88 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 9900493	A1	19990107	WO 1998-CA618	19980625 <--

W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG

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AU 9880970 A1 19990119 AU 1998-80970 19980625 <--
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JP 2002507889 T2 20020312 JP 1999-505174 19980625 <--
US 2002165383 A1 20021107 US 2002-32658 20020102 <--
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PRAI US 1997-882907 A 19970626 <--
WO 1998-CA618 W 19980625 <--

AB **Thermal hysteresis** (**antifreeze**) **proteins** (**THP**) that have up to 100 times the specific activity of fish **antifreeze proteins** have been isolated and purified from the common yellow mealworm beetle, **Tenebrio molitor. Tenebrio molitor** is a freeze-tolerant pest of stored grains in temperate regions, and it is the **thermal hysteresis** activity of their hemolymph that allows the insects to depress their f.ps. in the presence of ice or ice nucleators. Internal sequencing of the **proteins**, leading to cDNA cloning and production of the **protein** in bacteria, has confirmed the identity and activity of the 8.4 to 10.7 kDa **THP. THPs** are Thr- and Cys-rich **proteins** composed largely of 12-amino-acid repeats of Cys-Thr-Xaa-Ser-Xaa-Xaa-Cys-Xaa-Xaa-Ala-Xaa-Thr. At a concentration of 55 μg/mL, the **THP** depressed the f.p. 1.6 °C below the m.p., and at a concentration of .apprx.1 mg/mL the **THP** or its variants can account for the 5.5 °C of **thermal hysteresis** found in Tenebrio larvae. **THPs** function by an absorption-inhibition mechanism and produce oval-shaped ice crystals with curved prism faces. The purified, expressed **THP protein** can be directly added to an aqueous solution to depress the f.p., or transformed organisms expressing **THP** can be added to items which will be stored frozen. It is thus suggested that **THP** can be used for new techniques and compns. suitable for improving the preservation characteristics of organic materials at low temps., including storage of frozen foods, drugs, plasma, cells, plants, etc.

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Graham, L	1997	388	727	Nature	HCAPLUS
Heman, C	1994	3	1760	Protein Science	
Patterson, J	1982	219	381	J Exp Zool	HCAPLUS
Schneppenheim, R	1980	67B	561	Comp Biochem Physiol	HCAPLUS
Tomchaney, A	1982	21	716	Biochemistry	HCAPLUS
University of Notre Dam	1996			WO 9640973 A	HCAPLUS

L90 ANSWER 30 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:721241 HCAPLUS
DN 130:45468
TI **Crystallization** of **ice** in aqueous **solutions** of glycerol and dimethyl sulfoxide 2. **Ice crystal** growth kinetics

AU Hey, J. M.; MacFarlane, D. R.
CS Department of Chemistry, Monash University, Clayton, 3168, Australia
SO Cryobiology (**1998**), 37(2), 119-130
CODEN: CRYBAS; ISSN: 0011-2240
PB Academic Press
DT Journal
LA English
AB The **crystallization** of **ice** in aqueous **solns.** of glycerol and DMSO (Me2SO) was studied using a combined DSC-video microscope technique. The **solns.** studied were 50 weight/weight% glycerol and 45 weight/weight% Me2SO; both of these **solns.** have a solute concentration of .apprx.16 mol%. The rates of growth of the external surfaces of **ice crystals** from both of these **solns.** were determined over broad temperature ranges. The growth rates are generally independent of time, particularly at lower temps. The **ice crystal** growth rate in the glycerol **solution** became negligible at a significantly higher temperature than in the Me2SO **solution** Addition of **antifreeze protein** from the winter flounder at concns. of 1.7 and 9.9 mg g-1 has no significant effect on the **ice crystal** growth rates in 50 weight/weight% glycerol **solns.** (c) 1998 Academic Press.

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Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
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Bronshteyn, V	1992	29	782	Cryobiology	
Carpenter, J	1992	89	8953	Proc Natl Acad Sci U	HCAPLUS
Chang, Z	1991	12	215	Cryo Lett	HCAPLUS
Christian, J	1965			The Transformations	
DeVries, A	1984	304	575	Phil Trans R Soc Lon	HCAPLUS
DeVries, A	1969	163	1073	Science	HCAPLUS
DeVries, A	1971	172	1152	Science	HCAPLUS
Fahy, G	1995			Biological Ice Nucle	
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Hey, J	1996	33	205	Cryobiology	HCAPLUS
Hey, J	1997	211	262	J Non-Cryst Solids	HCAPLUS
Hey, J	1997	49	991	J Therm Anal	HCAPLUS
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Luyet, B	1968	10	167	Biodynamica	
MacFarlane, D	1986	27	228	Phys Chem Glasses	HCAPLUS
Mehl, P	1989	155	187	Thermochim Acta	HCAPLUS
Mehl, P				to be published in C	
Rapatz, G	1966	10	69	Biodynamica	
Raymond, J	1977	74	2589	Proc Natl Acad Sci U	HCAPLUS
Saito, Y	1996			Statistical Physics	
Sutton, R	1993	14	13	Cryo Lett	HCAPLUS
Sutton, R	1991	87	101	J Chem Soc Faraday T	HCAPLUS
Yeh, Y	1978	11	129	Acc Chem Res	HCAPLUS

L90 ANSWER 31 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:572198 HCAPLUS
DN 129:327403
TI A study on the growth habits of **ice crystal** in **antifreeze solution**
AU Li, Qianzhong; Luo, Liaofu
CS Laboratory of Theoretical Physics and Biology, Physics Department, Inner Mongolia University, Hohhot, 010021, Peop. Rep. China
SO Theoretical Biophysics and Biomathematics, Proceedings of the International Symposium, Hohhot, Peop. Rep. China, June 2-5, 1997 (**1997**), 108-112. Editor(s): Luo, Liaofu; Li, Qianzhong; Lee, Weijiang. Publisher: Inner Mongolia University Press, Hohhot, Peop. Rep.

China.
CODEN: 66QOA2
DT Conference
LA English
AB The presence of **antifreeze polypeptides** not only lowers the **freezing** temperature of a **solution** but also alters the growth habits and growth rates of **ice crystals** in the **antifreeze polypeptide solns.** The mechanism of **antifreeze polypeptides** is analyzed through a polymeric adsorption model proposed by us. The growth habits and growth rates of **ice crystals** can be quant. discussed. Theor. results are consistent with exptl. data. This may be useful for a fuller understanding of the mechanism of the **antifreeze polypeptides'** interactions on the surface of **ice crystal** that leads to anisotropic **crystal** growth facets.

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Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Davies, P	1990	4	2460	The FASEB J	HCAPLUS
Feeney, R	1994	13	347	J Carbohydrate Chemi	HCAPLUS
Feeney, R	1991	113	417	J Crystal Growth	HCAPLUS
Li, Q	1993	216	453	Chem Phys Lett	HCAPLUS
Li, Q	1994	223	181	Chem Phys Lett	HCAPLUS
Luo, L	1995	54	243	Int J Quantum Chem	HCAPLUS
Schrag, J	1982	717	322	Biochem Biophys Acta	HCAPLUS

L90 ANSWER 32 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:571814 HCAPLUS
DN 129:328887
TI Vitrification of mature mouse oocytes in a 6 M Me2SO **solution** supplemented with **antifreeze glycoproteins**: the effect of temperature
AU O'Neil, L.; Paynter, S. J.; Fuller, B. J.; Shaw, R. W.; DeVries, A. L.
CS Department of Obstetrics and Gynaecology, University of Wales College of Medicine, Cardiff, CF4 4XN, UK
SO Cryobiology (**1998**), 37(1), 59-66
CODEN: CRYBAS; ISSN: 0011-2240
PB Academic Press
DT Journal
LA English
AB Oocytes have been successfully **cryopreserved** using rapid and slow **freezing** procedures. However, variability in the success of replicates has limited its practical application. In the present study, mature mouse oocytes were vitrified in 6 M DMSO supplemented with 1 mg/mL **antifreeze glycoproteins** (**AFGP**) (**solution** known as VSD + **AFGP**) from the blood of Antarctic notothenioid **fish.** Such **AFGPs** have been used to **protect** mammalian cells during **hypothermia** and **cryopreservation.** However, the degree of **protection** afforded is a contentious issue. Stepwise addition of **cryoprotectant** was performed either at room temperature (19-21°C) or on **ice** (2-4°C), at the final stage of which oocytes were pipetted into 0.25 mL plastic insemination straws and held in liquid nitrogen vapor at -140°C for 3 min before being plunged into liquid nitrogen. Thawing involved holding the straw in the air for 10 s and then in water at 20°C for 10 s before dilution of the VSD **solution** with 1 M sucrose. Viability was assessed by in vitro fertilization; results have been quoted as median (range). Statistical analyses were performed using Kruskall-Wallis and Mann-Whitney U tests. Of the oocytes **cryopreserved** following exposure to VSD + **AFGP** at room temperature, 78% (0-94%) retained normal morphol. and, of these, 53% (0-100%)

cleaved to two cells. Of these two-cell embryos, 56% (0-100%) went on to develop to blastocyst. The overall percentage development to blastocyst, i.e., number of blastocysts/total number of oocytes treated + 100, was 20% (0-76%). Exposure of oocytes to the VSD + **AFGP** on **ice** prior to **cryopreservation** yielded significantly improved rates of fertilization (94%, 82-100%) and overall development to blastocyst (66%, 24-89%) when compared with oocytes **cryopreserved** following exposure to the VSD + **AFGP** at room temperature Rates of normality (86%, 35-95%) and development to blastocyst (89%, 64-100%) were also improved. **Cryopreservation** in 6 M DMSO supplemented with 1 mg/mL **AFGP** resulted in poor rates of survival which were highly variable when exposure to **cryoprotective** agent (CPA) was performed at room temperature Lowering the temperature of exposure to CPA prior to **cryopreservation** resulted in improved viability. (c) 1998 Academic Press.

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Cooper, A	1996	17	149	Cryo-Lett	
Devries, A	1971	246	305	J Biol Chem	HCAPLUS
Devries, A	1984	304	575	Philos Trans R Soc L	HCAPLUS
Devries, A	1969	163	1074	Science	
Hays, L	1996	93	6835	Proc Natl Acad Sci U	HCAPLUS
Jutte, N	1987	24	292	Cryobiology	HCAPLUS
Jutte, N	1987	24	403	Cryobiology	MEDLINE
Kasai, M	1992	46	1042	Biol Reprod	HCAPLUS
Kola, I	1988	38	467	Teratology	MEDLINE
Kono, T	1991	28	50	Cryobiology	MEDLINE
Leibo, S	1993	14	133	Cryo-Lett	
Massip, A	1986	7	270	Cryo-Lett	
Mugnano, J	1995	269	R474	Am J Physiol	HCAPLUS
Nakagata, N	1989	87	479	J Reprod Fert	MEDLINE
O'Neil, L	1997	18	17	Cryo-Lett	HCAPLUS
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O'Neil, L	1997	34	295	Cryobiology	HCAPLUS
Petzel, D	1992	29	782	Cryobiology	
Pickering, S	1990	54	102	Fertil Steril	MEDLINE
Pickering, S	1987	2	207	Hum Reprod	MEDLINE
Rall, W	1985	313	573	Nature	MEDLINE
Rubinsky, B	1990	173	1369	Biochem Biophys Res	HCAPLUS
Rubinsky, B	1991	12	93	Cryo-Lett	
Rubinsky, B	1992	29	69	Cryobiology	HCAPLUS
Shaw, P	1991	29	373	Mol Reprod Dev	MEDLINE
Shaw, P	1992	33	210	Mol Reprod Dev	MEDLINE
Takahashi, T	1986	23	103	Cryobiology	MEDLINE
Trounson, A	1986	46	1	Fertil Steril	MEDLINE
Vincent, C	1992	14	73	Oxford Rev Reprod Bi	MEDLINE
Wang, T	1994	31	185	Cryobiology	HCAPLUS
Wood, M	1993	49	489	Biol Reprod	HCAPLUS

L90 ANSWER 33 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:313718 HCAPLUS
DN 129:105659
TI Molecular characterization and sequencing of **antifreeze proteins** from larvae of the beetle Dendroides canadensis
AU Duman, J. G.; Li, N.; Verleye, D.; Goetz, F. W.; Wu, D. W.; Andorfer, C. A.; Benjamin, T.; Parmelee, D. C.
CS Department of Biological Sciences, University of Notre Dame, Notre Dame,

IN, 46556, USA
SO Journal of Comparative Physiology, B: Biochemical, Systemic, and Environmental Physiology (**1998**), 168(3), 225-232
CODEN: JPBPDL; ISSN: 0174-1578
PB Springer-Verlag
DT Journal
LA English
AB The deduced amino acid sequences of **antifreeze proteins** (**AFPs**) from larvae of the beetle Dendroides canadensis were determined from both complementary DNAs (cDNAs) and from **peptide** sequencing. These consisted of **proteins** with a 25-residue signal **peptide** and mature **proteins** 83 (Dendroides **antifreeze protein**; DAFP-1) or 84 (DAFP-2) amino acids in length which differed at only two positions. **Peptide** sequencing yielded sequences which overlapped exactly with those of the deduced cDNA sequences of DAFP-1 and DAFP-2, while the partial sequence of another **AFP** (DAFP-3) matched 21 of 28 residues. Seven 12- or 13-mer repeating units are present in these **antifreeze proteins** with a consensus sequence consisting of: Cys-Thr-X3-Ser-X5-X6-Cys-X8-X9-Ala-X11-Thr-X13, where X3 and X11 tend toward charged residues, X5 tends toward threonine or serine, X6 toward asparagine or aspartate, X9 toward asparagine or lysine, and X13 toward alanine in the 13-mers. The most interesting feature of these **proteins** is that throughout the length of the mature **antifreeze proteins** every sixth residue is a cysteine. These sequences are not similar to any of the known fish **AFPs**, but they are similar to **AFPs** from the beetle **Tenebrio molitor.**

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Duman, J	1979	25	805	J Insect Physiol	HCAPLUS
Graham, L	1997	388	727	Nature (Lond)	HCAPLUS
Granlie, B	1984	259	14960	J Biol Chem	
Griffith, M	1992		174	Advances in plant co	
Griffith, M	1992	10	593	Plant Physiol	
Hew, C	1983	61	2324	Can J Zool	HCAPLUS
Husby, J	1980	36	963	Experientia	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Komatsu, S	1970	245	2909	J Biol Chem	HCAPLUS
Lin, Y	1972	46	89	Biochem Biophys Res	
Olsen, T	1997	167	105	J Comp Physiol B	
Olsen, T	1997	114	114	J Comp Physiol B	
Patterson, J	1981	142B	539	J Comp Physiol	
Patterson, J	1979	210	361	J Exp Zool	HCAPLUS
Perlman, D	1983	167	391	J Mol Biol	HCAPLUS

Raymond, J	1977	16	2575	Biopolymers	HCAPLUS
Raymond, J	1977	86	881	Proc Natl Acad Sci U	
Raymond, J	1989	86	881	Proc Natl Acad Sci U	HCAPLUS
Sanger, F	1977	74	5463	Proc Natl Acad Sci U	HCAPLUS
Shier, W	1972	263	406	Biochim Biophys Acta	HCAPLUS
Shier, W	1975	54	135	FEBS Lett	HCAPLUS
Sicheri, F	1995	375	427	Nature (Lond)	HCAPLUS
Tomchaney, A	1982	21	716	Biochemistry	HCAPLUS
Tsunasawa, S	1993		45	Methods in protein s	HCAPLUS
Tursman, D	1994	268	347	J Exp Zool	
Tursman, D	1995	272	249	J Exp Zool	HCAPLUS
Tyshenko, M	1997	15	887	Nature Biotechnology	HCAPLUS
Urrutia, M	1992	1121	199	Biochim Biophys Acta	HCAPLUS
Wilson, P	1993	14	31	Cryo Lett	
Wu, D	1991	1076	416	Biochim Biophys Acta	HCAPLUS
Wu, D	1991	161	271	J Comp Physiol	HCAPLUS
Wu, D	1991	161	279	J Comp Physiol	HCAPLUS
Xu, L	1992	101B	105	Comp Biochem Physiol	HCAPLUS
Xu, L	1991	258	288	J Exp Zool	HCAPLUS

L90 ANSWER 34 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:100131 HCAPLUS
DN 128:240948
TI Quantitative estimation of the activation energy for **ice crystal** growth of **antifreeze glycoproteins solutions** under free growth conditions
AU Li, Qianzhong; Luo, Liaofu
CS Laboratory of Theoretical Physics and Biology, NeiMongol University, Hohhot, 010021, Peop. Rep. China
SO Neimenggu Daxue Xuebao, Ziran Kexueban (**1997**), 28(4), 505-507
CODEN: NDZKEJ; ISSN: 1000-1638
PB Neimenggu Daxue Xuebao Bianjibu
DT Journal
LA Chinese
AB According to the growth rate of **ice crystals**, the activation energies for **ice crystal** growth of **antifreeze glycoproteins solution** under free growth conditions were calculated

L90 ANSWER 35 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:1568 HCAPLUS
DN 128:72167
TI Spruce budworm **antifreeze proteins**, the genes encoding them and their uses
IN Walker, Virginia K.; Davies, Peter L.; Rahavard, Mitra; Tyshenko, Michael G.
PA Queen's University At Kingston, Can.; Walker, Virginia K.; Davies, Peter L.; Rahavard, Mitra; Tyshenko, Michael G.
SO PCT Int. Appl., 73 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 9746674	A1	19971211	WO 1997-CA371	19970603 <--

W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, KE, LS, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN,

ML, MR, NE, SN, TD, TG
AU 9728838 A1 19980105 AU 1997-28838 19970603 <--
AU 726696 B2 20001116
CN 1221450 A 19990630 CN 1997-195223 19970603 <--
EP 939808 A1 19990908 EP 1997-922790 19970603 <--
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI
JP 2001505404 T2 20010424 JP 1998-500038 19970603 <--
KR 2000016268 A 20000325 KR 1998-709841 19981203 <--
PRAI US 1996-657264 A2 19960603 <--
WO 1997-CA371 W 19970603 <--

AB A class of **thermal hysteresis, antifreeze proteins (THPs)** has been isolated and purified from Choristoneura sp., including the spruce budworm C. fumiferana, and the genes encoding them have been cloned. Antibodies have been raised against these **proteins.** The invention also includes a method for decreasing the f.p. of an aqueous **solution** by adding these **antifreeze proteins** to the **solution** that may be of use in preventing **freeze**/thaw **damage** of **frozen** foods, e.g. **fish.** The **proteins** were purified chromatog. from Choristoneura larvae homogenates with purification monitored by measurement of **thermal hysteresis** of fractions. Amino acid sequence-derived primers were used to amplify cDNAs for the **proteins.**

L90 ANSWER 36 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:779569 HCAPLUS
DN 128:125036
TI **Ice**-binding mechanism of winter flounder **antifreeze proteins**
AU Cheng, Ailan; Merz, Kenneth M., Jr.
CS Department of Chemistry, The Pennsylvania State University, University Park, PA, 16802, USA
SO Biophysical Journal (**1997**), 73(6), 2851-2873
CODEN: BIOJAU; ISSN: 0006-3495
PB Biophysical Society
DT Journal
LA English
AB The winter flounder **antifreeze protein (AFP)** and 2 of its mutants were studied using mol. dynamics simulation techniques. The simulations were performed under 4 conditions: in the gas phase, solvated by water, adsorbed on the **ice** (20.hivin.21) **crystal** plane in the gas phase and in aqueous **solution** This study provided details of the **ice**-binding pattern of the winter flounder **AFP.** Simulation results indicated that the Asp, Asn, and Thr residues in the **AFP** are important in **ice** binding and that Asn and Thr as a group bind cooperatively to the **ice** surface. These **ice**-binding residues can be collected into 4 distinct **ice**-binding regions: Asp-1/Thr-2/Asp-5, Thr-13/Asn-16, Thr-24/Asn-27, and Thr-35/Arg-37. These 4 regions are 11 residues apart and the repeat distance between them matches the **ice** lattice constant along the <.hivin.1102> direction. This match is crucial to ensure that all 4 groups can interact with the **ice** surface simultaneously, thereby, enhancing **ice** binding. These Asx (x = p or n)/Thr regions each form 5-6 H-bonds with the **ice** surface: Asn forms .apprx.3 H-bonds with **ice** mols. located in the step region whereas Thr forms 1-2 H-bonds with the **ice** mols. in the ridge of the (20.hivin.21) **crystal** plane. Both the distance between Thr and Asn and the ordering of the 2 residues are crucial for effective **ice** binding. The proper sequence is necessary to generate a binding surface that is compatible with the **ice** surface topol., thus providing a perfect "host/guest" interaction that simultaneously satisfies both

H-bonding and van der Waals interactions. The results also show the relation among binding energy, the number of H-bonds, and the activity. The activity is correlated to the binding energy, and in the case of the mutants the authors studied the number of H-bonds. The greater the number of the H-bonds, the greater the **antifreeze** activity. The roles of van der Waals interactions and the hydrophobic effect play in **ice** binding are also highlighted. For the latter it is demonstrated that the surface of **ice** has a clathrate-like structure which favors the partitioning of hydrophobic groups to the surface of **ice**. It is suggested that mutations that involve the deletion of hydrophobic residues (e.g., the Leu residues) will provide insight into the role the hydrophobic effect plays in partitioning these **peptides** to the surface of **ice**.

RETABLE

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Arav, A	1993	36	488	Mol Reprod Dev	HCAPLUS
Bash, P	1987	236	564	Science (Washington)	HCAPLUS
Berendsen, H	1984	81	3684	J Chem Phys	HCAPLUS
Burcham, T	1984	139	197	Anal Biochem	HCAPLUS
Chakrabartty, A	1989	264	11307	J Biol Chem	HCAPLUS
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Cheng, A	1996	100	1927	J Phys Chem	HCAPLUS
Chou, K	1992	223	509	J Mol Biol	HCAPLUS
Creighton, T	1993			Protein Structures a	
Davies, P	1990	4	2460	FASEB J	HCAPLUS
Devries, A	1970	245	2901	J Biol Chem	HCAPLUS
Feeney, R	1986	15	59	Annu Rev Biophys Bio	HCAPLUS
Feeney, R	1993		82	Food Technol	
Hansen, T	1993	64	1843	Biophys J	HCAPLUS
Hays, L	1993	64	296a	Biophys J	
Hew, C	1986	160	267	Eur J Biochem	HCAPLUS
Jia, Z	1996	384	285	Nature	HCAPLUS
Jorgensen, H	1993	6	19	Protein Engin	HCAPLUS
Jorgensen, W	1983	79	926	J Chem Phys	HCAPLUS
Karim, O	1988	89	6889	J Chem Phys	HCAPLUS
Kenward, K	1993	23	377	Plant Mol Biol	HCAPLUS
Kerr, W	1987	85	449	J Cryst Growth	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Knight, C	1984	308	295	Nature	HCAPLUS
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Madura, J	1994	116	417	J Am Chem Soc	HCAPLUS
McDonald, S	1993	33	1481	Biopolymers	HCAPLUS
Myers, J	1996	71	2033	Biophys J	HCAPLUS
Pain, R	1988	333	207	Nature	MEDLINE
Pearlman, D	1991			AMBER 4.0	
Raymond, J	1977	74	2589	Proc Natl Acad Sci U	HCAPLUS
Rossky, P	1979	101	1913	J Am Chem Soc	HCAPLUS
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Sicheri, F	1995	375	427	Nature	HCAPLUS
Sonnichsen, F	1996	4	1325	Structure	MEDLINE
Swaminathan, S	1978	100	5705	J Am Chem Soc	HCAPLUS
Teeter, M	1984	81	6014	Proc Natl Acad Sci U	HCAPLUS
Tirado-Rives, J	1990	112	2773	J Am Chem Soc	HCAPLUS
Weiner, S	1984	106	765	J Am Chem Soc	HCAPLUS
Wen, D	1992	63	1659	Biophys J	HCAPLUS
Wen, D	1993	317	31	FEBS Lett	HCAPLUS
Wen, D	1992	267	14102	J Biol Chem	HCAPLUS
Wyckoff, R	1969			Crystal Structures	
Yang, D	1988	333	232	Nature	HCAPLUS
Yeh, Y	1996	96	601	Chem Rev	HCAPLUS

L90 ANSWER 37 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:726499 HCAPLUS
DN 128:2477
TI Chemical adjuvant **cryosurgery** with **antifreeze proteins**
AU Koushafar, H.; Pham, L.; Lee, C.; Rubinsky, Boris
CS Biomed. Engineering lab., Dep. of Mech. Eng., Univ. of California, Berkeley, CA, 94720, USA
SO Journal of Surgical Oncology (**1997**), 66(2), 114-121
CODEN: JSONAU; ISSN: 0022-4790
PB Wiley-Liss
DT Journal
LA English
AB Imaging monitored **cryosurgery** is emerging as an important minimally invasive surgical technique for treatment of cancer. Although imaging allows excellent control over the process of **freezing** itself, recent studies show that at high subzero temps. cells survive **freezing**. **Antifreeze proteins** (**AFP**) are chemical compds. that modify **ice crystals** to needle-like shapes that can destroy cells in cellular suspensions. The goal of this study was to determine whether these **antifreeze proteins** can also destroy cells in **frozen** tissue and serve as chemical adjuvants to **cryosurgery**. Livers from six rats were excised, perfused with **solns**. of either phosphate-buffered saline (PBS) or PBS with 10 mg/mL **AFP**-I, and **frozen** with a special **cryosurgery** apparatus Lobes were **frozen** with one or two **freeze**-thaw cycles and the cell viability was examined with a two stain fluorescent dye test and histol. assessment. A significant percentage of hepatocytes survive **freezing** on the margin of a **frozen cryolesion**. **AFP** increase cellular destruction in that region apparently through formation of intracellular **ice**. Thus, **antifreeze proteins** may be effective chemical adjuvants to **cryosurgery**.

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Arnott, J	1845			On the present state	
Coger, R	1994	116	173	J Offsh Mech Arc Res	
Ishiguro, H	1994	31	483	Cryobiology	MEDLINE
Koushafar, H	1997	49	421	Urology	MEDLINE
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Mazur, P	1970	68	939	Science	
Merryman, M	1966			Cryobiology	
Mugnano, J	1995	269	R474	Am J Physiol	HCAPLUS
Onik, G	1991	67	901	Cancer	MEDLINE
Onik, G	1993	72	1291	Cancer	MEDLINE
Onik, G	1984	21	321	Cryobiology	MEDLINE
Pease, G	1995	117	59	J Biomech Eng ASME T	MEDLINE
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Raymond, J	1977	74	2589	Proc Natl Acad Sci U	HCAPLUS
Rivoire, M	1969	61	242	J Surg Oncol	
Rubinsky, B	1985	22	55	Cryobiology	
Rubinsky, B	1989	26	580	Cryobiology	
Rubinsky, B	1993	30	191	Cryobiology	MEDLINE
Rubinsky, B	1978	100	300	J Heat Transf ASME T	
Rubinsky, B	1986	108	48	Mech Eng	
Rubinsky, B	1988	234	343	Proc R Soc Lond [Bio	MEDLINE
Tatsutani, K	1996	48	441	Urology	MEDLINE

L90 ANSWER 38 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1997:674903 HCAPLUS
DN 127:328027
TI Vapor pressure of aqueous **antifreeze glycopeptide solutions**
AU Westh, Peter; Ramlov, Hans; Wilson, Peter W.; DeVries, Arthur L.
CS Department of Life Sciences and Chemistry, Roskilde University, Roskilde, DK-4000, Den.
SO Cryo-Letters (**1997**), 18(5), 277-282
CODEN: CRLED9; ISSN: 0143-2044
PB Cryo-Letters
DT Journal
LA English
AB Measurements are reported of the vapor pressure of liquid, partially **frozen**, and **frozen** aqueous **solns.** of **antifreeze glycopeptides** at temps. ranging from -1 to 0 °C. Results indicate that at a given temperature, the activity of water in liquid or partially **frozen** (ca. 5% **ice** content) **solns.** is approx. the same as the activity of pure supercooled water. In a completely **frozen solution**, on the other hand, water activity is equal to that of pure **ice.** The data show that the **antifreeze peptides** only affect bulk properties of liquid as well as **frozen solns.** to a very limited extent, and, thus, provide direct evidence that the **inhibiting** effect of these mols. on **ice** formation is an entirely kinetic (non-equilibrium) phenomenon.

L90 ANSWER 39 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:565551 HCAPLUS
DN 127:275629
TI Hyperactive **antifreeze protein** from beetles
AU Graham, Laurie A.; Liou, Yih-Cherng; Walker, Virginia K.; Davies, Peter L.
CS Dep. Biochem. Biol., Queen's Univ., Kingston, ON, K7L 1N6, Can.
SO Nature (London) (**1997**), 388(6644), 727-728
CODEN: NATUAS; ISSN: 0028-0836
PB Macmillan Magazines
DT Journal
LA English
AB The authors have purified and cloned 4 **thermal hysteresis proteins** from a fat body cDNA library which possess up to 100-times the specific activity of fish **antifreeze proteins** from the common yellow mealworm beetle **Tenebrio Molitor.** The **proteins** are threonine and cysteine rich, of relative mol. mass 8,400, composed largely of 12-amino acid repeats. It's estimated that a concentration of 1 mg/mL of this **protein** can account for the 5.5°C of **thermal hysteresis** found in **Tenebrio Molitor.**

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Davies, P	1990	4	2460	FASEB J	HCAPLUS
Devries, A	1983	45	245	Annu Rev Physiol	HCAPLUS
Grimstone, A	1968	253	343	Phil Trans R Soc Lon	
Horwath, K	1996	93	419	Eur J Entomol	HCAPLUS
Knight, C	1991	59	409	Biophys J	HCAPLUS
Patterson, J	1982	219	381	J Exp Zool	HCAPLUS
Schneppenbeim, R	1980	67	561	Comp Biochem Physiol	
Sonnichsen, F	1995	4	460	Prot Sci	HCAPLUS
Tomchaney, A	1982	21	716	Biochemistry	HCAPLUS
Wilson, P	1993	14	31	Cryo-Letters	
Wishart, D	1994	10	121	Comput Appl Biosci	HCAPLUS

L90 ANSWER 40 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1997:529059 HCAPLUS
DN 127:192333
TI **Ice** slurry made from an **antifreeze protein solution** for **ice storage** applications
AU Grandum, S.; Yabe, A.; Nakagomi, K.; Tanaka, M.; Takemura, F.; Kobayashi, Y.; Frivik, P. E.
CS Institute of Engineering Mechanics, University of Tsukuba, Japan
SO Proceedings - International Congress of Refrigeration, 19th, The Hague, Aug. 20-25, 1995 (**1995**), Volume 3A, 86-90 Publisher: Institut International du Froid, Paris, Fr.
CODEN: 64VHAQ
DT Conference
LA English
AB The influence of **antifreeze proteins** (**AFPs**) on the growth of **ice crystal** was studied for the purpose of utilizing the resulting flowable **ice** slurry in **cold heat storage** applications. Important parameters like **storage** ability and flowability was exptl. studied for various concns. of the **protein** in the water **solution** In the temperature range down to -1°, most of the latent **heat** is accumulated in the **crystal** slurry, indicating that the temperature of the flowable **ice** slurry should be from this value above. Such a temperature dependency description is given.

L90 ANSWER 41 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:527762 HCAPLUS
DN 127:195492
TI Tissue destruction in **cryosurgery** by use of **thermal hysteresis**
IN Rubinsky, Boris; Koushafar, Amir-Homayoon
PA Regents of the University of California, USA
SO U.S., 7 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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	JP 2000507864	T2	20000627	JP 1997-535430	19970326 <--
	IL 125981	A1	20020210	IL 1997-125981	19970326 <--
PRAI	US 1996-625074	A	19960329 <--		
	WO 1997-US5028	W	19970326 <--		

AB Cell and tissue destruction by **cryoablation** is enhanced by perfusion of the cells with **thermal hysteresis proteins** (e.g. **antifreeze proteins** and **glycoproteins** of **fish**) prior to **cryogenic freezing.** The **proteins** promote the growth of spicular **ice crystals** in the intracellular fluid, which destroy the cell by piercing the cell membrane. This decreases the incidence of cell **preservation** by **freezing**, thereby permitting a more uniform and controllable destruction of undesirable tissue by **cryoablation.** Thus, human prostate cancer tissue slices **frozen** in saline **solution** containing Pleuronectes americanus **thermal hysteresis protein** (mol. weight 3600) and thawed showed complete cell destruction, whereas cell destruction was only partial after **freezing** in the absence of the **thermal hysteresis protein.**

L90 ANSWER 42 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:481501 HCAPLUS
DN 127:159302
TI **Crystallization** of water **solutions** of

antifreezes from **fishes** and amphipods
AU Andreev, A. A.; Pertopavlov, N. N.
CS Russian Acad. Sci., Institute Cell Biophysics, Pushchino, Russia
SO Biofizika (**1996**), 41(6), 1294-1297
CODEN: BIOFAI; ISSN: 0006-3029
PB Nauka
DT Journal
LA Russian
AB A comparative anal. of two types of **cryoprotectants**, **antifreeze glycoproteins** from Atlantic cod (Gadus morhua) and carbohydrates from hemolymph of amphipod crustacean (Gammarus lacustris) has been performed. Both **glycoprotein** and carbohydrate **antifreezes** effectively decreased the f.p. of water **solns.** and diminished the size of **ice crystals** formed. Noncolligative and colligative mechanisms of action are characteristic correspondingly for **glycoproteins** and carbohydrates.

L90 ANSWER 43 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:468862 HCAPLUS
DN 127:193037
TI Characteristics of **ice** slurry containing **antifreeze protein** for **ice storage** applications
AU Grandum, Svein; Yabe, Akira; Tanaka, Makoto; Takemura, Fumio; Nakagomi, Kazuya
CS University of Tsukuba, Tsukuba, 305, Japan
SO Journal of Thermophysics and Heat Transfer (**1997**), 11(3), 461-466
CODEN: JTHTEO; ISSN: 0887-8722
PB American Institute of Aeronautics and Astronautics
DT Journal
LA English
AB For the development of flowable **ice** for **storage** and long distance transportation purposes that is resistant to **recrystn.** and contains defined **crystal** structures the characteristics of an **ice** slurry generated from an **antifreeze protein solution** have been examined Three methods for obtaining the **antifreeze protein** are described. In **crystal** growth studies it has been shown that controlling the supercooling is important to generate the desired needle-type **crystals**, coming from an effective adsorption of **antifreeze proteins** to the **ice** surface. The **ice** slurry's **thermal storage** ability is found using a differential scanning calorimeter. Furthermore, the slurry flowability is examined using both a capillary tube viscometer and a test loop, the latter is used for comparison of the pressure drop with liquid pure water as well as for the visualization of the slurry flow. For an **ice** content of 30%, the pressure drop in a 6-mm in diameter tube at 1 m/s flow is found to be twice the value for liquid pure water.

L90 ANSWER 44 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:300392 HCAPLUS
DN 126:273798
TI Microscale analysis of **crystals** in **ice** slurry made from an **antifreeze protein solution**
AU Grandum, Svein; Yabe, Akira; Nakagomi, Kazuya; Tanaka, Makoto; Takemura, Fumio; Kobayashi, Yasunori; Frivik, Per-Erling
CS Ind. Technology Res. Inst., Japan
SO Nippon Kikai Gakkai Ronbunshu, B-hen (**1997**), 63(607), 1029-1034
CODEN: NKGBDD; ISSN: 0387-5016
PB Nippon Kikai Gakkai
DT Journal
LA Japanese

AB In order to clarify the **crystal** growth mechanism and to realize the low-temperature **heat** transportation system of **ice** slurry made from an **antifreeze protein** (**AFP**) **solution** which consists of **ice crystals** resistant to **recrystn.**, a fundamental and microscale anal. has been conducted on the **ice crystals.** Since the **thermophys.** properties of **ice** slurry used for **ice storage** applications, such as energy **storage** ability and flowability, depend on the shape and size of individual **crystals**, **crystal** growth patterns were exptly. investigated by changing the local supercooling temperature while neglecting the influence of **heat** flux. At low temps., when supercooling exceeded a certain transition value, dendritic **crystals** were generated, which were apparently unaffected by the existence of **AFP.** In between the transition temperature and the f.p., needle-like **crystals** were observed to grow rapidly in the c-axis direction. If these needle-like **crystals** were held at temps. within the **hysteresis** gap (between the **freezing** and the m.p.), bipyramidal **crystals** within a maximum tip angle of approx. 30° were formed. Since **protein** adsorption to the **ice crystal** surface will strongly affect the **crystal** growth, the surface of **crystals** was investigated by using a Scanning Tunneling Microscope (STM) in order to determine the influence of **AFP** on the microscale surface structure. A systematic groove/ridge pattern that was aligned 60° (±5°) to the hexagonal side on one bipyramidal plane was observed The grooves' length and width were similar to the length and width of **AFP**, indicating adsorption of single **protein** mols. to **ice** with an orientation corresponding to the alignment angle. Their depth, ranging from 2 mm to 10 nm, gives information about the surface curvature. Knowledge from microscale anal. can be used in order to create cost-effective artificial additives for **ice** slurry systems.

L90 ANSWER 45 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:233164 HCAPLUS
DN 126:262012
TI Tracking the profile of a specific **antifreeze protein** and its contribution to the **thermal hysteresis** activity in **cold** hardy insects
AU **Horwath, Kathleen L.; Easton, Christopher M.;** Poggioli, George J., Jr.; Myers, Kevin; Schnorr, Ingrid L.
CS Department of Biological Sciences, Binghamton University, Binghamton, NY, 13902-6000, USA
SO European Journal of Entomology (**1996**), 93(3), 419-433 CODEN: EJENE2; ISSN: 1210-5759
PB Czech Academy of Sciences, Institute of Entomology
DT Journal
LA English
AB This study summarizes some important new directions in research on **antifreeze protein** biosynthesis and regulation. It describes the recent development and availability of essential biochem. and cellular tools that make possible more direct cellular investigations, and an assessment of the relation between **thermal hysteresis protein** (**THP**) levels and **antifreeze** activity (both **thermal hysteresis** and **recrystn. inhibition** [RI]). These tools include: the isolation of a specific **THP** of high activity (designated Tm 12.86), and an addnl. endogenous activating factor of this **antifreeze protein**; the ability to track the cellular and secretory patterns of Tm 12.86 immunol.; the use of an in vitro fat body cell culture system for direct investigation of cellular events, and,

a means of quantifying RI behavior of purified Tm 12.86, and samples of unknown concns. of **THPs**, to provide a more sensitive detection method for **antifreeze** activity at scaled down values associated with the in vitro system. In combination, these studies indicate that the adaptation mechanisms contributing to the overall **antifreeze protein** response in a **cold** hardy insect involves a complex interaction between **antifreeze proteins** and endogenous activators of these **proteins.** With the availability of these key tools, the details of a precise and seasonal regulation of these **antifreeze protein**/activator interactions, which ultimately generate an efficient **cold** hardy response, now have the potential to be worked out.

L90 ANSWER 46 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:124669 HCAPLUS
DN 126:235947
TI Purification, characterization, and structural analysis of a **plant** low-temperature-induced **protein**
AU Botthe, Joseph G.; Sonnichsen, Frank D.; de Bues, Mitchel D.; Johnson-Flanagan, Anne M.
CS Dep. Agric., Univ. Alberta, Edmonton, AB, T6G 2P5, Can.
SO Plant Physiology (**1997**), 113(2), 367-376
CODEN: PLPHAY; ISSN: 0032-0889
PB American Society of Plant Physiologists
DT Journal
LA English
AB We have purified to near homogeneity a recombinant form of the **protein** BN28 (rBN28), expressed in response to low temperature in Brassica napus **plants**, and we have determined its **solution** structure. Antibodies raised against rBN28 were used to characterize the recombinant and native **proteins.** Similar to many other low-temperature-induced **proteins**, BN28 is extremely hydrophilic, such that it remains soluble following boiling. Immunoblot anal. of subcellular fractions indicated that BN28 was not strongly associated with cellular membranes and was localized exclusively within the soluble fraction of the cell. Contrary to predicted secondary structure that suggested significant helical content, CD anal. revealed that rBN28 existed in aqueous **solution** largely as a random coil. However, the helical propensity of the **protein** could be demonstrated in the presence of trifluoroethanol. NMR anal. further showed that rBN28 was in fact completely unstructured (100% coil) in aqueous **solution** Although it had earlier been speculated that BN28-like **proteins** from Arabidopsis thaliana might possess **antifreeze protein** activity, no such activity could be detected in **ice recrystn.** assays with rBN28.

L90 ANSWER 47 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:739617 HCAPLUS
DN 126:44122
TI A study of the growth rates and growth habits of **ice crystals** in a **solution** of **antifreeze** (glyco) **proteins**
AU Li, Qianzhong; Luo, Liaofu
CS Laboratory of Theoretical Physics and Biology, Physics Department, Inner Mongolia University, Hohhot, 010021, Peop. Rep. China
SO Chemical Physics Letters (**1996**), 263(5), 651-654
CODEN: CHPLBC; ISSN: 0009-2614
PB Elsevier
DT Journal
LA English
AB The mechanism of the **antifreeze glycoprotein/ antifreeze protein** interaction on the surface of **ice** is analyzed. The theory of **ice crystal**

growth in an AF(G)P **solution** is presented. A quant. calcn. of the growth rates for grain growth has been obtained. The anisotropic growth habits and growth rates of **ice crystals** in an AF(G)P **solution** are explained.

L90 ANSWER 48 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:492029 HCAPLUS
DN 125:191250
TI **Cryopreservation** of mammalian embryos and oocytes: Recent advances
AU Palasz, Andre T.; Mapletoft, Reuben J.
CS WCVM, University Saskatchewan, Saskatoon, SK, S7N 5B4, Can.
SO Biotechnology Advances (**1996**), 14(2), 127-149
CODEN: BIADDD; ISSN: 0734-9750
PB Elsevier
DT Journal; General Review
LA English
AB A review with 149 refs. The **cryopreservation** of embryos of most domestic species has become a routine procedure in embryo transfer, and recently, advances have been made in the **cold storage** of mammalian oocytes. The ability to sustain viable oocytes and embryos from mammalian species at low temperature for prolonged periods of time has important implications to basic and applied biotechnol. Recent advances in the study of physicochem. behavior of different **cryoprotectants**, use of various macromol. additives in **cryoprotective solns.** and isolation and use of **proteins** of **plant** and animal origin with **antifreeze** activity offers many new options for **cryopreservation** of oocytes and embryos of animal and human origin. At the same time rapidly developing methods of oocyte/embryo manipulation such as in vitro embryo production, embryo splitting, embryo biopsies for gene and sex determination, embryo cloning and the isolation of individual blastomers, create new challenges in **cryopreservation.** Very recent advances in the **cryopreservation** of mammalian oocytes, in vivo- and in vitro-derived embryos, and micromanipulated embryos are reviewed in this manuscript.

L90 ANSWER 49 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:233990 HCAPLUS
DN 124:310590
TI The growth habits of **ice crystals** in fishy **antifreeze polypeptide solution**
AU Li, Quianzhong
CS Laboratory of theoretical Physics and Biology, Neimonggu Univ., Hohhot, 010021, Peop. Rep. China
SO Neimenggu Daxue Xuebao, Ziran Kexueban (**1996**), 27(1), 58-60
CODEN: NDZKEJ; ISSN: 1000-1638
PB Neimenggu Daxue Xuebao Bianjibu
DT Journal
LA Chinese
AB The structural properties of **fish antifreeze polypeptide** and the mechanisms of AGFP/**AFP** interaction on the surface of **ice crystal** were studied. The theory of an **ice crystal** growth in **AFGP/AFP solution** was presented. The periodic bond chain theory ws expressed in a quant. form. The anisotropic growth habits of **ice crystals** were explained.

L90 ANSWER 50 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:185582 HCAPLUS
DN 124:253761
TI Cloning and Baculovirus expression of a desiccation stress gene from the

beetle, **Tenebrio molitor**
AU Graham, Laurie A.; Bendena, William G.; Walker, Virginia K.
CS Dep. of Biology, Queen's Univ., Kingston, ON, K7L 3N6, Can.
SO Insect Biochemistry and Molecular Biology (**1996**), 26(2), 127-33
CODEN: IBMBES; ISSN: 0965-1748
PB Elsevier
DT Journal
LA English
AB The cDNA sequence encoding a novel desiccation stress **protein** (dsp28) found in the hemolymph of the common yellow mealworm beetle, **Tenebrio molitor**, has been determined, the sequence encodes a 225 amino acid **protein** containing a 20 amino acid signal **peptide.** The dsp28 shows no significant similarity to any known nucleic acid or **protein** sequence. Levels of dsp28 mRNA were found to increase approx. 5-fold following desiccation. The dsp28 cDNA has been cloned into a baculovirus expression vector and the expressed **protein** was compared to native dsp28. Both dsp28 expressed by recombinant baculovirus and native dsp28 are glycosylated and N-terminally processed. Although dsp28 is induced by cold and addition to desiccation stress, it does not contribute to the f.p. depression (**thermal hysteresis**) observed in Tenebrio hemolymph.

L90 ANSWER 51 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:78870 HCAPLUS
DN 124:140186
TI Direct measurement of **thermal hysteresis** effect of **antifreeze protein solution** by differential scanning calorimetry
AU Chen, Tingchao; Zhang, Jizhen; Yang, Jingwen; Ye, Wen; Fei, Yunbiao
CS Inst. Biophys., Acad. Sinica, Beijing, 100101, Peop. Rep. China
SO Shengwu Wuli Xuebao (**1995**), 11(3), 309-13
CODEN: SWXUEN; ISSN: 1000-6737
PB Shengwu Wuli Xuebao
DT Journal
LA Chinese
AB The direct microscopic observation has been used to measure the **thermal hysteresis** effects of **antifreeze proteins** in the literature. The amount of **ice crystals** in the system is roughly estimated by the observed volume of **ice** nuclei, and thus it is much more artificial. Here we report a direct differential scanning calorimetric measurement of the **thermal hysteresis** effect of **antifreeze protein solution** from ammopiptanthus mongolicus. The **thermal hysteresis** temperature and amount of **ice crystal** nuclei are quant. measured from DSC **thermograms**, melting and **freezing** enthalpies. Compared to the results reported in the literature, this **antifreeze protein** shows a much higher **antifreeze** activity and thus a new and accurate procedure to measure the activity of **antifreeze protein solution** is provided.

L90 ANSWER 52 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1996:4538 HCAPLUS
DN 124:80068
TI Second harmonic generation studies of the **ice**/water interface
AU Bouchez, Cynthia M.; Hicks, Janice M.
CS Department Chemistry, Georgetown University, Washington, DC, 20057, USA
SO Proceedings of SPIE-The International Society for Optical Engineering (**1995**), 2547(Laser Techniques for Surface Science II), 152-63
CODEN: PSISDG; ISSN: 0277-786X
PB SPIE-The International Society for Optical Engineering
DT Journal
LA English

AB Understanding the structure of the interface between **ice** and liquid water is essential to the study of mol. adsorption at this boundary. Despite great interest in the **ice**/water interface, exptl. studies are sparse. In this work, the nonlinear optical laser technique, second harmonic generation (SHG), is used in a total internal reflection (TIR) geometry to probe the single **crystalline ice**/water interface. SHG signals from the clean **ice**/water interface are observed and attributed to symmetry breaking at the boundary. The authors report observation of a linear adsorption isotherm when water is replaced by 0.2 to 7 μM **solns.** of 2,2'-dihydroxy-1,1'-binaphthyl (BN). The coverage is most likely submonolayer; therefore, the authors observe only the beginning of the adsorption profile. The authors argue that BN adsorption is entropy driven. In a sep. study, 0.02 to 1 mg/mL **solns.** of winter flounder **antifreeze protein** are contacted with the **ice.** The adsorption profile closely follows the f.p. depression activity curve of the **protein.**

L90 ANSWER 53 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1995:765907 HCAPLUS
DN 123:166092
TI **Antifreeze glycoproteins** promote intracellular **freezing** of rat cardiomyocytes at high subzero temperatures
AU Mugnano, J. A.; Wang, T.; Layne, J. R., Jr.; DeVries, A. L.; Lee, R. E., Jr.
CS Dep. Zool., Miami Univ., Oxford, OH, 45056, USA
SO American Journal of Physiology (**1995**), 269(2, Pt. 2), R474-R479
CODEN: AJPHAP; ISSN: 0002-9513
PB American Physiological Society
DT Journal
LA English
AB Despite recent reports that **antifreeze glycoproteins** (**AFGPs**) **protect** mammalian cells during low-temperature **preservation**, T. Wang, et al. (1994) reported that **AFGPs** failed to **protect** rat hearts during **freezing.** Rather, the presence of **AFGPs** exacerbated cardiac **damage** after **freezing.** This study examined the effects of **freezing** (-4°C) in the presence of **AFGPs** at the cellular level with the use of **cryomicroscopy.** Large, blunt **ice crystals** formed in the **solns.** without **AFGPs** and excluded most cardiomyocytes from the plane of **ice** formation. After thawing, cells appeared similar in morphol. to **unfrozen** cells. **Ice** in 0.5 mg/ml **AFGP solution** was more dendritic and prismatic than **ice** formed in the absence of **AFGPs.** On thawing, many cells exhibited spontaneous contraction, resulting in cell death. Spicular **ice** formed rapidly in the 10 mg/ml **AFGP solution** These needlelike **ice crystals** appeared to penetrate the cardiomyocytes, resulting in intracellular **freezing** followed by cell lysis. These **AFGP**-induced changes in **ice crystal** structure may account for the **injury** observed in whole heart and cardiomyocyte expts.

L90 ANSWER 54 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1995:533953 HCAPLUS
DN 123:6651
TI Evaluation of propanediol, ethylene glycol, sucrose and **antifreeze proteins** on the survival of slow-cooled mouse pronuclear and 4-cell embryos
AU Shaw, J. M.; Ward, C.; Trounson, A. O.
CS Institute Reproduction and Development, Monash University, Clayton, 3168, Australia
SO Human Reproduction (**1995**), 10(2), 396-402
CODEN: HUREEE; ISSN: 0268-1161

DT Journal
LA English
AB Mouse pronuclear and 4-cell embryos were **cryopreserved** by slow cooling to -33° in 1.5 M 1,2-propanediol or 1.5 M ethylene glycol, with or without 0.1 M sucrose. Straws were thawed by immersion into a 37° water bath, immediately after their removal from liquid nitrogen (protocol 1), or after being held in air for 15 (protocol 2) or 30 s (protocol 3). Others were held in air until the **ice** melted (protocol 4). Embryos which formed blastocysts that hatched and attached to the Petri dish in vitro (plated) were considered viable. The thawing protocol did not significantly influence the viability of embryos **frozen** in propanediol with 0.1 M sucrose (52-72% of pronuclear and 69-97% of 4-cell embryos plated). In the other **solns.** tested, propanediol without sucrose and ethylene glycol with/without sucrose, only protocol 2 resulted in uniformly high development of both pronuclear (45-65% plating) and 4-cell embryos (70-97% plating). Thawing protocol 4 significantly reduced development, in particular for embryos **frozen** in ethylene glycol (0% 1-cell; 0-25% 4-cell plating). The difference between thawing protocols 2 and 4 was reduced by continuing slow cooling of ethylene glycol **solns.** to lower temps. (-41°). Adding **antifreeze proteins** type I or III did not improve survival or development. Thus, although mouse pronuclear and 4-cell embryos can be **frozen**-thawed in either ethylene glycol or propanediol without significant loss of viability, an appropriate thawing protocol is essential for embryos **frozen** in ethylene glycol or propanediol-sucrose.

L90 ANSWER 55 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1995:373187 HCAPLUS
DN 122:129063
TI Biochemical and molecular biological studies of **antifreeze proteins** from the insect **Tenebrio molitor**
AU Tang, Wei
CS State Univ. New York, Binghampton, NY, USA
SO (**1993**) 154 pp. Avail.: Univ. Microfilms Int., Order No. DA9417873
From: Diss. Abstr. Int. B, 1994, 55(2), 307-8
DT Dissertation
LA English
AB Unavailable

L90 ANSWER 56 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1995:202635 HCAPLUS
DN 122:3729
TI Measurement of grain growth in the **recrystallization** of rapidly **frozen solutions** of **antifreeze glycoproteins**
AU Yeh, Y.; Feeney, R. E.; Mckown, R. L.; Warren, G. J.
CS Univ. California, Davis, CA, USA
SO Biopolymers (**1994**), 34(11), 1495-504
CODEN: BIPMAA; ISSN: 0006-3525
PB Wiley
DT Journal
LA English
AB A quant. estimate of the activation energy for grain growth has been obtained by analyzing **ice recrystn.** expts. from water and from **solns.** with small amts. (<1.0 μg/mL) of **antifreeze glycoprotein** (**AFGP**). Rates of grain growth are measured as changes of grain diameter in time, with the supercooled holding temperature and **glycoprotein** concentration as parameters. Arrhenius plots of these rates vs. (1/T) yielded slopes proportional to the activation energies for the particular species. The values of activation energy are almost

independent of **solution** concentration or the species of **AFGP**. Averaged activation energy value for the **AFGP**-4 species is Qg = (6.61) + 105 J/mol. The "less active" **AFGP**-8 yielded an average Qg = (5.71) + 105 J/mol, quite similar to the **AFGP**-4 species. The activation energy for **recrystn.** in a pure **ice**-water system was estimated from two temperature points, t = -5.4 and -7.5°. The best value is 2.39+105 J/mol, nearly twice that obtained by M. N. Martino and N. E. Zaritsky [(1989) **Cryobiol.**, Volume 26, p. 138] in a **recrystn.** experiment using salt **soln**., but much smaller than the values derived from the **AFGP solns.** Results further show that activation entropy is at least a factor of 2 larger for the **AFGP** species than that of pure **ice**-water system under the same growth conditions. These results suggest significant roles, both energetically and entropically, for **AFGP** mols. in their ability to **inhibit** grain growth of **ice.**

L90 ANSWER 57 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:553829 HCAPLUS
DN 121:153829
TI Characterization of primary cell cultures derived from fat body of the beetle, **Tenebrio molitor**, and the immunolocalization of a **thermal hysteresis protein** in vitro
AU **Easton, Christopher M.; Horwath, Kathleen L.**
CS Department of Biological Sciences, Binghamton University, Binghamton, NY, 13902-6000, USA
SO Journal of Insect Physiology (**1994**), 40(6), 537-47
CODEN: JIPHAF; ISSN: 0022-1910
DT Journal
LA English
AB A cell culture system was developed for **Tenebrio molitor** fat body to investigate the regulation of **thermal hysteresis protein** (**THP**) production To establish the reliability of this system the authors compared the histol. and **THP** distribution of cultured fat body cells to the features of intact tissue. Cell cultures established from fat body contained three major cell types: globular, stellate and rounded cells. Globular cells resembled mature trophocytes of in vivo fat body. They contained large lipid vesicles, **protein** granules, and extensive glycogen stores. Stellate and rounded cells lacked **protein** granules, and contained varying amts. of lipids and glycogen. **THPs** were localized in the cytoplasm of cultured cells, associated with **protein**-containing granules in globular cells, or within discrete vesicles in the other cell types. In intact fat body, **THPs** were primarily localized to the accumulated **protein** granules. These results are the first to suggest that there is intracellular **storage** of **THPs** in the fat body. Such **storage** provides the potential for later mobilization during periods of low temperature and/or desiccation. Furthermore, the authors' fat body primary cultures morphol. and functionally resemble their in vivo counterparts and will be useful in addressing questions about the regulation of **THP** synthesis and secretion by insect fat body.

L90 ANSWER 58 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:530859 HCAPLUS
DN 121:130859
TI **Antifreeze glycoproteins** from Antarctic notothenioid **fishes** fail to **protect** the rat cardiac explant during **hypothermic** and **freezing preservation**
AU Wang, Tingchung; Zhu, Qingyan; Yang, Xiaoping; Layne, Jack R. Jr.; Devries, Arthur L.
CS Dep. Surg., Univ. Rochester, Rochester, NY, 14642, USA
SO Cryobiology (**1994**), 31(2), 185-92

CODEN: CRYBAS; ISSN: 0011-2240
DT Journal
LA English
AB The Antarctic notothenioid **fishes** avoid **freezing** through the action of circulating **antifreeze glycoproteins** (**AFGPs**). This study investigated whether **AFGPs** could serve as **cryoprotectants** for the isolated rat heart under three different **storage** conditions. Hearts were flushed with 15 mg **AFGP**/mL cardioplegic **solution** (CP) and stored for 9 h at 0°. This **AFGP** concentration has been reported to **protect** pig oocytes during **hypothermic storage**. Hearts were flushed with 10 mg **AFGP**/mL CP-14 and stored **frozen** at -1.4° for 3 h. At this concentration the **AFGPs** reduce the **solution** f.p. and also change the **crystal** morphol. from dendritic to spicular. Hearts were flushed with 10 μg **AFGP**/mL CP-15 and stored **frozen** at -1.4° for 5 h. At this low concentration the **AFGPs** have a strong **inhibitory** effect on **ice recrystn.**, but have little effect on the f.p. and less apparent effect on the **crystal** habit. After **hypothermic** or **freezing storage**, the functional viability was assessed by determining cardiac output (CO) during working reperfusion. No difference in CO was found between **AFGP**-treated and untreated hearts after 9 h of 0° **storage**. CO in hearts **frozen** in CP-14 without **AFGPs** recovered to 50% of the freshly perfused control hearts. Hearts **frozen** in the presence of high concns. of **AFGPs** (10 mg/mL CP-14) failed to beat upon thawing and reperfusion, although their tissue **ice** content was less than that found in hearts without **AFGP** treatment. Hearts **frozen** with low concns. of **AFGPs** (10 μg/mL CP-15) showed reduced recovery upon thawing and reperfusion compared to CP-15 hearts, which recovered to 67% of freshly perfused controls. Thus, notothenioid **fish AFGPs** not only fail to enhance **storage** of the isolated rat heart preparation at **hypothermic** temps., but cause increased **damage** under **freezing** conditions regardless of **AFGP** concentration

L90 ANSWER 59 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:266141 HCAPLUS
DN 120:266141
TI Extraction and isolation of **antifreeze proteins** from winter rye (Secale cereale L.) leaves
AU Hon, Wai-Ching; Griffith, Marilyn; Chong, Pele; Yang, Daniel S. C.
CS Dep. Biochem., McMaster Univ., Hamilton, ON, L8N 3Z5, Can.
SO Plant Physiology (**1994**), 104(3), 971-80
CODEN: PLPHAY; ISSN: 0032-0889
DT Journal
LA English
AB Apoplastic exts. of **cold**-acclimated winter rye (Secale cereale cv Musketeer) leaves were previously shown to exhibit **antifreeze** activity. The objectives of the present study were to identify and characterize individual **antifreeze proteins** present in the apoplastic exts. The highest **protein** concns. and **antifreeze** activity were obtained when the leaf apoplast was extracted with ascorbic acid and either CaCl2 or MgSO4. Seven major **polypeptides** were purified from these exts. by one-dimensional SDS-PAGE under nonreducing conditions. The five larger **polypeptides**, of 19, 26, 32, 34, and 36 kD, exhibited significant levels of **antifreeze** activity, whereas the 11- and 13-kD **polypeptides** showed only weak activity. Five of these **polypeptides** migrated with higher apparent mol. masses on SDS gels after treatment with 0.1 M dithiothreitol, which indicated the presence of intramol. disulfide bonds. The apparent reduction of the disulfide bonds did

not eliminate **antifreeze** activity in four of the **polypeptides** that contained intramol. disulfide bonds and exhibited significant levels of **antifreeze** activity. The amino acid compns. of these **polypeptides** were similar in that they were all relatively enriched in the residues Asp/Asn, Glu/Gln, Ser, Thr, Gly, and Ala; they all lacked His, except for the 26-kD **polypeptide**, and they contained up to 5% Cys residues. These **polypeptides** were examined with antisera to other cystine-containing **antifreeze proteins** from **fish** and insects, and no common epitopes were detected. It is concluded that **cold** -acclimated winter rye leaves produce multiple **polypeptides** with **antifreeze** activity that appear to be distinct from **antifreezes** produced by **fish** and insects.

L90 ANSWER 60 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:212024 HCAPLUS
DN 120:212024
TI **Protein** purification from a complex **solution** with silica gel as sorbent
IN Lusk, Lance T.; Goldstein, Henry
PA Miller Brewing Co., USA
SO U.S., 7 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5278284	A	19940111	US 1992-882793	19920514 <--
	EP 646594	A1	19950405	EP 1993-115953	19931002 <--
	EP 646594	B1	19970604		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE				
	AT 154033	E	19970615	AT 1993-115953	19931002 <--
	ES 2105033	T3	19971016	ES 1993-115953	19931002 <--
	JP 07145192	A2	19950606	JP 1993-251960	19931007 <--
PRAI	US 1992-882793		19920514 <--		
	EP 1993-115953		19931002 <--		

AB A method of removing a **protein** from a complex **solution** and recovering the **protein** in purified form consists of adding a silica gel sorbent having a pore size approx. the mol. size of the **protein** to a **solution** containing the **protein**, allowing the **protein** to be sorbed onto the sorbent, separating the sorbent from the **solution**, and then recovering the **protein** from the sorbent. To demonstrate the usefulness of the method in removing a valuable **protein** from milk, **anti-freeze protein** (**AFP**) was mixed with cow's milk to yield a mixture which might be similar to the milk from a transgenic cow producing **AFP**. The **AFP** was effectively separated from the casein, whey milk **proteins** and cream with the silica cogel DP4660. The micellar forms of casein and whey were probably excluded from the cogel pores. The **AFP** was desorbed from the DP4660 with 50% ethanol.

L90 ANSWER 61 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:102680 HCAPLUS
DN 120:102680
TI Microscopic pattern of **ice crystal** growth in the presence of **thermal hysteresis proteins**
AU Coger, Robin; Rubinsky, Boris; Fletcher, Garth
CS Dep. Mech. Eng., Univ. California, Berkeley, CA, USA
SO HTD (American Society of Mechanical Engineers) (**1992**), 205(Heat Transfer in Phase Change), 37-46
CODEN: ASMHD8; ISSN: 0272-5673
DT Journal

LA English
AB This study examines the effect of **thermal hysteresis proteins** (**THPs**) from the winter flounder (Pleuronectes americanus) on the **ice**-water interface morphol. during **freezing** of aqueous **solns.** Expts. were performed using a directional solidification stage, and the development of the two phase interface was observed through a light microscope and recorded by a video system. Unusual **ice crystal** morphologies were observed, including faceted **ice crystal** growth along the [1100] **crystal** plane; spicular, or needle-like **ice crystal** growth in the [1010] direction; and **ice crystal** growth in the direction of the c-axis, [0001], with incorporated liquid inclusions bounded by hexagonal prism faces. The observed **crystallog.** structures can be explained as an effect of the interaction between the **THPs** and the primary prism faces of **ice crystals.** This results in an increase in the Gibbs free energy of these planes, followed by **ice** growth into the **thermodynamically** supercooled liquid adjacent to these faces.

L90 ANSWER 62 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:99763 HCAPLUS
DN 120:99763
TI The kinetic theory of **thermal hysteresis** of a macromolecule **solution**
AU Li, Qianzhong; Luo, Liaofu
CS Physics Department, Inner Mongolia University, Huhehote, 010021, Peop. Rep. China
SO Chemical Physics Letters (**1993**), 216(3-6), 453-7
CODEN: CHPLBC; ISSN: 0009-2614
DT Journal
LA English
AB By use of the Flory-Huggin lattice model, the kinetic theory of the **thermal hysteresis** (the difference between the growing point and m.p. of **ice crystals**) of a macromol. **solution** is presented. As an example, the **thermal hysteresis** of an **antifreeze protein solution** is calculated

L90 ANSWER 63 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1993:622774 HCAPLUS
DN 119:222774
TI **Hypothermic preservation** of human oocytes with **antifreeze proteins** from sub-polar **fish**
AU Itskovitz-Eldor, J.; Levron, J.; Arav, A.; Bar-Ami, S.; Stein, D. W.; Fletcher, G. L.; Rubinsky, B.
CS Dep. Obstet. Gynecol., Rambam Med. Cent., Haifa, 31096, Israel
SO Cryo-Letters (**1993**), 14(4), 235-42
CODEN: CRLED9; ISSN: 0143-2044
DT Journal
LA English
AB Mature human oocytes were **preserved** at 4° for 20 h in phosphate buffer **solution** (PBS) and in PBS **solution** with various concns. of **antifreeze proteins** (**AFPs**) isolated from the winter flounder or the ocean pout. Fertilization and early embryo cleavage rates were increased by the addition of **AFPs** 1 mg/mL and reduced when the concentration of **AFPs** was increased to 10 mg/mL. These preliminary results are consistent with earlier animal studies and with the known ability of **AFPs** to stabilize membranes at **hypothermic** temps.

L90 ANSWER 64 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1993:250983 HCAPLUS
DN 118:250983

TI Devitrification in butane-2,3-diol **solutions** containing **anti-freeze peptide**
AU Sutton, Robin L.; Pegg, David E.
CS Dep. Surg., MRC Med. Cryobiol. Group, Cambridge, CB2 2AH, UK
SO Cryo-Letters (**1993**), 14(1), 13-20
CODEN: CRLED9; ISSN: 0143-2044
DT Journal
LA English
AB **Cryopreservation** of viable tissues and organs by vitrification requires that devitrification (**freezing**) be prevented during warming. It is reported that a synthetic **antifreeze**, modeled on the natural **peptide** found in the Winter Flounder Pseudopleuronectes americanus, substantially raises the devitrification temperature of **solns.** of the **cryoprotectant** butane-2,3-diol. The addition of 1% weight/weight **peptide** reduces the min. warming rate to avoid devitrification of a 30% **solution** by a factor of 7000.

L90 ANSWER 65 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1993:207877 HCAPLUS
DN 118:207877
TI Molecular dynamics simulation of winter flounder **antifreeze protein** variants in **solution**: correlation between side chain spacing and **ice** lattice
AU Jorgensen, H.; Mori, M.; Matsui, H.; Kanaoka, M.; Yanagi, H.; Yabusaki, Y.; Kikuzono, Y.
CS Biotechnol. Lab., Sumitomo Chem. Co., Ltd., Takarazuka, 665, Japan
SO Protein Engineering (**1993**), 6(1), 19-27
CODEN: PRENE9; ISSN: 0269-2139
DT Journal
LA English
AB The **solution** structure of the 38 amino acid C-terminal region of the precursor for the HPLC-6 **antifreeze protein** from winter flounder has been investigated with mol. dynamics using the AMBER software. The simulation for the **peptide** in aqueous **solution** was carried out at a constant temperature of 0° and at atmospheric pressure. The simulation covered 120 ps and the results were analyzed based on data sampled upon reaching a stable equilibrium phase. Information has been obtained on the quality of constant temperature and pressure simulations, the **solution** structure and dynamics, the hydrogen bonding network, the helix-stabilizing role of terminal charges and the interaction with the surrounding water mols. The Lys18-Glu22 interactions and the terminal charged residues are found to stabilize a helical structure with the side chains of Thr2, Thr13, Thr24 and Thr35 equally spaced on one side of the helix. The spacing between oxygen atoms in the hydroxyl group of the threonine side chains exhibits fluctuations of the order of 2-3 Å during the 120 ps of simulation, but values simultaneously close to the repeat distance of 16.6 Å between oxygen atoms along the [01.hivin.12] direction in **ice** are observed Furthermore, two engineered variants were studied using the same simulation protocol.

L90 ANSWER 66 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1993:163527 HCAPLUS
DN 118:163527
TI Low temperature **crystallization** of aqueous **solutions** in the presence of serum **antifreeze glycoproteins** of the cod Gadus morhua
AU Karanova, M. V.; Andreev, A. A.; Petropavlov, N. N.
CS Inst. Biol. Phys., Pushchino, Russia
SO Problemy Kriobiologii (**1992**), (1), 23-7
CODEN: PKRIEA; ISSN: 1026-1230
DT Journal
LA Russian

AB The structure of **ice** formed upon **freezing** of aqueous **solns.** in the presence of **antifreeze glycoproteins** of different purification degrees isolated from G. morhua serum consists of line **crystals** with indistinct interfaces. Sometimes, the **crystals** had a distinct axial direction.

L90 ANSWER 67 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1992:171053 HCAPLUS
DN 116:171053
TI The **cryoprotective** effect of **antifreeze glycopeptides** from Antarctic **fishes**
AU Rubinsky, B.; Arav, A.; DeVries, A. L.
CS Dep. Mech. Eng., Univ. California, Berkeley, CA, 94720, USA
SO Cryobiology (**1992**), 29(1), 69-79
CODEN: CRYBAS; ISSN: 0011-2240
DT Journal
LA English
AB The addition of **fish antifreeze glycopeptides** (**AFGPs**) to vitrifying **solns.** increases post-thaw viability in cultured immature pig oocytes and 2-cell stage embryos of mice and pigs after rapid cooling to **cryogenic** temps. The criterion for viability is maturation to metaphase for the oocytes and the ability to develop into the 4-cell stage for the pig embryo and the blastocyte stage for the mouse embryo. Without **AFGPs**, or with addition of **antifreeze peptides** (**AFPs**), the particular vitrifying **solution** and cooling/warming/culturing regime used in this study produced zero viability. In the presence of the **AFGps** (40 mg/mL), survival of pig oocytes and embryos was increased to .apprx.25%, and that of mouse embryos to 82%. Dose-response studies for the mouse embryos showed that the **protective** effect of **AFGPs** shows saturation kinetics and levels off at 20 mg/mL. The **AFGPs** appeared to **preserve** cell membrane structural integrity; however, an intact cell membrane did not always lead to viability. The absence of **protective** effect by **AFPs** suggests that **protection** by the **AFGPs** is unrelated to their common **antifreeze** property, i.e., **inhibition** of **ice crystal** growth, but probably results from interaction with and stabilization of the cell membranes unique to the **AFGPs.**

L90 ANSWER 68 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1992:170715 HCAPLUS
DN 116:170715
TI A role for juvenile hormone in the induction of **antifreeze protein** production by the fat body in the beetle **Tenebrio molitor**
AU Xu, Lei; Duman, John G.; Wu, Ding Wen; Goodman, Walter G.
CS Dep. Biol. Sci., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Comparative Biochemistry and Physiology, Part B: Biochemistry & Molecular Biology (**1992**), 101B(1-2), 105-9
CODEN: CBPBB8; ISSN: 0305-0491
DT Journal
LA English
AB Tenebrio larvae treated topically with JH-I and maintained under non-inducing conditions (16 light/8 dark photoperiod 23° and 90% relative humidity) elevated hemolymph **antifreeze protein** activity and concentration Juvenile hormone (JH) titers (measured by RIA) were elevated in larvae acclimated to **antifreeze protein** inducing conditions (short photoperiod or cold temperature). Fat bodies incubated in Grace's medium increased **antifreeze protein** when JH was added to the medium, but only when the fat bodies were taken from larvae which had been primed by a previous JH treatment.

L90 ANSWER 69 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1992:2444 HCAPLUS
DN 116:2444
TI Calorimetric analysis of **antifreeze glycoproteins** of the polar **fish**, Dissostichus mawsoni
AU Hansen, Thomas N.; DeVries, Arthur L.; Baust, John G.
CS Cent. Cryobiol. Res., SUNY, Binghamton, NY, 13901, USA
SO Biochimica et Biophysica Acta (**1991**), 1079(2), 169-73
CODEN: BBACAQ; ISSN: 0006-3002
DT Journal
LA English
AB **Solns.** of **antifreeze glycoproteins** 1 through 5 and 8 were analyzed for activity by differential scanning calorimetry. With a scan rate of 1° min-1, **antifreeze glycoproteins** 1-5 (20 mg/mL) revealed **antifreeze** activity with a delay in the **freeze** exotherm during cooling in the presence of **ice**. **Antifreeze glycoprotein** 8 (60 mg/mL), however, did not reveal **antifreeze** activity. When a 0.1° min-1 scan rate was used, **glycoproteins** 1-5 again yielded a delay in the **freeze** onset, but the exotherm consisted of multiple events. At the slower scan rate **glycoprotein** 8 revealed an initial **freeze** followed by multiple exothermic events resembling those of **glycoproteins** 1-5. **Thermograms** exhibiting **antifreeze** activity had an initial shoulder in the exotherm direction upon cooling followed by a delay before the exotherm. The shoulders were correlated with c-axis **ice** growth observed in visual methods. The **glycoprotein antifreezes** had a linear increase in activity with decreased **ice** content.

L90 ANSWER 70 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1991:667158 HCAPLUS
DN 115:267158
TI Investigations of the differential affinity of **antifreeze glycoprotein** for single **crystals** of **ice**
AU Feeney, R. E.; Fink, W. H.; Hallett, J.; Harrison, K.; Osuga, D. T.; Vesenka, J. P.; Yeh, Y.
CS Dep. Food Sci. Technol., Univ. California, Davis, CA, 95616, USA
SO Journal of Crystal Growth (**1991**), 113(3-4), 417-29
CODEN: JCRGAE; ISSN: 0022-0248
DT Journal
LA English
AB Two distinctively different expts. showing the differential affinity of **antifreeze glycoproteins** (**AFGP**) for the facets of **ice crystals** are presented. In free growth studies of single seed **crystals** of **ice** into **solns.** of **AFGP**, clear distinction between **crystals** growing in the **AFGP solution** and similar **crystals** growing in pure water is found. Immediately upon going below the temperature of **freezing** depression, **crystals** grow along the c-axis as long spicules, not dendrites within the basal plane as is the case of growth in pure water. The rates of growth of the spicules are higher than growth velocity of dendrites in pure water. As the supercooling is increased, both morphol. and rate become more like that of growth in pure water. Dynamic light scattering studies of the **ice-soln** . interface were also conducted. In these expts., the local concentration of **AFGP** in the neighborhood of the interface was monitored by the effect of these mols. on microbubbles present near the growing interface; **AFGP** mols. showed preference towards the prismatic facets. All of these exptl. observations support the idea of a dynamic adsorption/desorption equilibrium that is facet dependent.

L90 ANSWER 71 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1991:578705 HCAPLUS
DN 115:178705
TI The effect of **antifreeze protein** on the devitrification of a **cryoprotective** system
AU Chang, Zhaohua; Hansen, Thomas N.; Baust, John G.
CS Cent. Cryobiol. Res., State Univ. New York, Binghamton, NY, 13902-6000, USA
SO Cryo-Letters (**1991**), 12(4), 215-26
CODEN: CRLED9; ISSN: 0143-2044
DT Journal
LA English
AB The effects of **antifreeze protein** (**AFP**) from the common mealworm, **Tenebrio molitor**, on the devitrification of a glassy system (55% aqueous glycerol) were studied by differential scanning calorimetry. The effects of various concns. of **AFP** extract (1 to 200 mg/mL) were analyzed at various warming rates (0.5 to 20° min.-1). The results revealed that while the glass-liquid transition temperature was only slightly affected, the devitrification event generally shifted to lower temps. with the addition of **AFP**. For a vitrified sample warmed at a rate higher than 2.5° min.-1, the presence of **AFP** (100 mg/mL) depressed the devitrification temperature but not the **ice** content. The extent of devitrification was generally reduced at very slow warming rates and/or higher **AFP** concentration (>150 mg/mL). The results suggest that the addition of **AFP** to **cryoprotective solns.** may have adverse effects on **cryopreservation**, although the application of high concentration of **AFP** in combination with low warming rates seems to help stabilize the glassy state and therefore may improve the survival rate of **cryopreserved** samples.

L90 ANSWER 72 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1991:140235 HCAPLUS
DN 114:140235
TI Enhancement of insect **antifreeze protein** activity by antibodies
AU Wu, Ding Wen; Duman, John G.; Xu, Lei
CS Dep. Biol. Sci., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Biochimica et Biophysica Acta (**1991**), 1076(3), 416-20
CODEN: BBACAQ; ISSN: 0006-3002
DT Journal
LA English
AB The activity of 2 insect **antifreeze proteins** is greatly increased by the addition of specific rabbit polyclonal antibodies to the **antifreezes.** A model is presented which suggests that the enhancement occurs because the **antifreeze**-antibody complex, being much larger than the **antifreeze protein** alone (a minimal 7-8-fold increase in size), blocks a larger area of the ice crystal surface and extends further above the surface, thus requiring the temperature to be further lowered before crystal growth proceeds. This idea is further supported by the finding that addition of goat anti-rabbit IgG to the **antifreeze protein** + anti-**antifreeze protein** antibody complexes further enhanced activity.

L90 ANSWER 73 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1989:590897 HCAPLUS
DN 111:190897
TI Differential scanning calorimetric analysis of **Tenebrio molitor antifreeze protein** activity
AU Hansen, Thomas N.; Baust, John G.
CS Cent. Cryobiol. Res., State Univ. New York, Binghamton, NY, 13901, USA
SO Cryobiology (**1989**), 26(4), 383-8
CODEN: CRYBAS; ISSN: 0011-2240
DT Journal

LA English
AB Recently a new method for anal. of **antifreeze proteins** by differential scanning calorimetry has been developed (Hansen, T. N.; Baust, J. G., 1988). However, the parameters used were not examined for possible maximal activity. To test the parameters, pooled hemolymph samples of the common mealworm larva, **T. molitor** (25°, 16 h:8 h light:dark), were collected and analyzed for activity. The samples were held at -40° and at various annealing temps. for different lengths of time (0 to 360 min). No difference in activity was observed in the freeze intervals, while significant differences were observed in annealing times of less than 3 min. Hemolymph samples were also tested for **antifreeze** activity at various scan rates (0.1-10°/min). Significant differences in activity were observed for each rate. Both the short annealing times and the cooling rates were due to methodol. and not sample. The best parameters consisted of a 5-min freeze at -40°, a 5-min annealing interval, and a 1°/min cooling rate. To test the optimized parameters, pooled samples of **T. molitor** hemolymph were monitored for changes in activity over time (up to 60 days) at various storage temps. (-17, -80, -196°). No changes in activity were observed These results suggest that care must be given to the reporting of the specific conditions used in the anal. of **antifreeze** activity.

L90 ANSWER 74 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1989:36437 HCAPLUS
DN 110:36437
TI Differential scanning calorimetric analysis of **antifreeze protein** activity in the common mealworm, **Tenebrio molitor**
AU Hansen, Thomas N.; Baust, John G.
CS Cent. Cryobiol. Res., State Univ. New York, Binghamton, NY, 13901, USA
SO Biochimica et Biophysica Acta (**1988**), 957(2), 217-21
CODEN: BBACAQ; ISSN: 0006-3002
DT Journal
LA English
AB **Antifreeze proteins** (**AFP**) are able to inhibit the growth of ice-crystals at temps. below the equilibrium f.p. (Tf) of hemolymph. The anal. of **AFP** activity has commonly involved the use of direct microscopic observation of a sample following inoculation with ice. The resulting activity, defined as the amount of **thermal hysteresis** observed between Tf and the subsequent rapid growth of ice, has been reported to range up to 7°. However, most studies report high level of variation, possibly due to ice-crystal size variability and the presence of nonvisible ice nuclei. A new method is described of anal. of **AFP** activity using differential scanning calorimetry. DSC anal. reveals much high activity, up to 10°, with less variation observed within a sample, and is not subject to the difficulty of accurate assessment of ice-crystal volume

L90 ANSWER 75 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1988:85457 HCAPLUS
DN 108:85457
TI Effects of **antifreeze glycoproteins** on linear **crystallization** velocities of **ice**
AU Kerr, W. L.; Osuga, D. T.; Feeney, R. E.; Yeh, Y.
CS Dep. Food Sci. Technol., Univ. California, Davis, CA, 95616, USA
SO Journal of Crystal Growth (**1987**), 85(3), 449-52
CODEN: JCRGAE; ISSN: 0022-0248
DT Journal
LA English
AB The **crystal** growths of water and **solns.** of **antifreeze glycoproteins** (**AFGP**) are compared. By using linear growth in plastic tubes, both the linear **crystallization**

velocities (LCV) and **ice crystal** growth patterns were observed as a function of temperature and concentration of **AFGP**. Upon lowering the temperature below the **freezing** temperature, there was an abrupt increase in LCV of the **AFGP solution** above that encountered in the pure water-**ice** system. This enhanced LCV formed a plateau over a wide range of supercooling, eventually changing to LCV less than that of the pure water-**ice** system. The growth patterns of **ice** in the **AFGP solns.** were very different (more needle-like) from that in water.

L90 ANSWER 76 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1987:511404 HCAPLUS
DN 107:111404
TI **Ice** growth in supercooled **solutions** of **antifreeze glycoprotein**
AU Harrison, K.; Hallett, J.; Burcham, T. S.; Feeney, R. E.; Kerr, W. L.; Yeh, Y.
CS Desert Res. Inst., Reno, NV, 89506, USA
SO Nature (London, United Kingdom) (**1987**), 328(6127), 241-3
CODEN: NATUAS; ISSN: 0028-0836
DT Journal
LA English
AB An **antifreeze glycoprotein** mixture (**AFGP**), isolated from the blood serum of Pagothenia borchgrevinki, prevented the growth of **ice crystals** until -0.5°, whereupon a dramatic increase in **crystal** growth rate (.apprx.5-fold of that in pure H2O) was observed Further supercooling only marginally increased this rate, so that at -2°, the rate of growth of **ice** in **AFGP** was surpassed again by that in H2O. Substantial differences in the morphol. of **crystal** growth habit were observed, suggesting that **AFGP** mols. **inhibit ice** formation by blocking rough growth perpendicular to the c-axis in addition to **inhibiting** surface nucleation.

L90 ANSWER 77 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1987:447000 HCAPLUS
DN 107:47000
TI Recent experimental work on solute redistribution at the **ice**/water interface. Implications for electrical properties and interface processes
AU Gross, G. W.; Gutjahr, A.; Caylor, K.
CS New Mexico Inst. Min. Technol., Socorro, NM, 87801, USA
SO Journal de Physique, Colloque (**1987**), (C1), C1-527/C1-533
CODEN: JPQCAK; ISSN: 0449-1947
DT Journal
LA English
AB Redistribution of NaF, HCl, NaCl, NH4F, and **AFGP** (**antifreeze glycoprotein**) at the **ice**/water interface was studied under near-equilibrium constrained growth conditions. The distribution coefficient of NaF declined from 2 + 10-1 (at 10-6 N) and the distribution coefficient of the 2 chlorides was 3 + 10-3 and invariant with initial liquid concns. in the range 5 + 10-6 N to 5 + 10-4 N. At 10-6 N concentration of the mother **solution**, the distribution coefficient of NH4F is strongly pH dependent. **AFGP** is the most highly soluble of known impurities in **ice**, with a distribution coefficient close to unity. In unstirred **solns.**, traces of **AFGP** in the mother **solution** caused an increase in the distribution coefficient of HCl due to instabilities in the flux fields of **heat** and solute.

L90 ANSWER 78 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1987:80581 HCAPLUS
DN 106:80581

TI **Antifreeze** activity of Antarctic **fish** **glycoprotein** and a synthetic polymer
AU Franks, F.; Darlington, J.; Schenz, T.; Mathias, S. F.; Slade, L.; Levine, H.
CS Dep. Bot., Univ. Cambridge, Cambridge, CB2 3EA, UK
SO Nature (London, United Kingdom) (**1987**), 325(6100), 146-7
CODEN: NATUAS; ISSN: 0028-0836
DT Journal
LA English
AB **Antifreeze glycoproteins** (**AFGPs**) and **proteins** isolated from the sera of some polar **fish** species and overwintering insects are able to depress the **freezing** temperature of the aqueous body fluids (and of water) by a noncolligative mechanism.
All previous measurements of the **antifreeze** effect have been performed on bulk samples under conditions where **ice** nucleation would be catalyzed by particulate impurities, giving limited and indeterminate degrees of undercooling. Here, the 1st measurements are reported of homogeneous (spontaneous) **ice** nucleation rates in deeply undercooled (<233 K) **solns.** of **AFGP** and polyvinylpyrrolidone (PVP), a well-characterized polymer which finds use as a **cryoprotectant.** The **antifreeze** activity is thought to derive from the sorption of **AFGP** mols. on the active growth sites of **ice crystals**, preventing normal growth and inducing unusual **crystal** habits. Here, expts. were performed on the **inhibition** of **ice crystal** growth in **solns.** containing **AFGP** and PVP under standardized conditions, and it was found that the homogeneous nucleation and **crystallization** rates were sensitive to low concns. of both substances, but **AFGP** was remarkably effective at **inhibiting ice crystal** growth.

L90 ANSWER 79 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1987:2412 HCAPLUS
DN 106:2412
TI **Antifreeze glycopeptides** and **peptides**: interactions with **ice** and water
AU DeVries, Arthur L.
CS Dep. Physiol. Biophys., Univ. Illinois, IL, 61801, USA
SO Methods in Enzymology (**1986**), 127(Biomembranes, Pt. O), 293-303
CODEN: MENZAU; ISSN: 0076-6879
DT Journal; General Review
LA English
AB A review and discussion with 18 refs., on the purification, detection, and properties of **antifreeze glycopeptides**, **peptides**, and **proteins** of arctic and northern temperate zone **fishes.** The determination of the m.p. and f.p. of **antifreeze peptide solns.** are also reviewed. The interactions of the **peptides** with **ice** and water are briefly discussed.

L90 ANSWER 80 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1986:550226 HCAPLUS
DN 105:150226
TI **Thermoperiodic** involvement in **antifreeze** **protein** production in the **cold** hardy beetle Dendroides canadensis: implications for photoperiodic time measurement
AU **Horwath, Kathleen L.**; Duman, John G.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Journal of Insect Physiology (**1986**), 32(9), 799-806
CODEN: JIPHAF; ISSN: 0022-1910
DT Journal
LA English

AB The role for **thermoperiods** (i.e., the duration of **thermophase** (T) and **cryophase** (C) during a 24-h period) in the regulation of **antifreeze protein** production was studied in D. canadensis. Larvae were exposed to **thermocycles** consisting of long (16 h) and short (8 h) **thermophases** in the form T/C, 25°/17°, while maintained in a background of either constant darkness, or constant light. Short-day **thermoperiods** stimulated, whereas long-day **thermoperiods** prevented, **antifreeze protein** production under both aperiodic lighting conditions. If the C temperature was allowed to reach 13° (T/C, 25°/13°), significant differences between long- and short-day **thermoperiodic** responses persisted in both constant light and constant darkness, whereas the overall levels of **antifreeze protein** production increased under constant light conditions independent of the **thermoperiod.** Studies incorporating conflicting photothermal regimes in the form short photoperiod with a long **thermoperiod**, and vice versa, triggered intermediate **antifreeze protein** activity. Thus, D. canadensis are capable of distinguishing long- from short-day **thermoperiods**, over the cycling temperature from 25° to 13°, and will initiate **antifreeze protein** production under the appropriate conditions. Furthermore, the expression of this **thermoperiodic** response under both constant darkness and constant light holds important implications for photoperiodic time measurement in this species by suggesting that the circadian clock involved with daylength measurement is of an internal coincidence type. The observed interaction of the light-cycle and **thermocycle** in the regulation of **antifreeze protein** production is discussed from the perspective of entrainment of the D. canadensis circadian system.

L90 ANSWER 81 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1986:221063 HCAPLUS
DN 104:221063
TI A kinetic description of **antifreeze glycoprotein** activity
AU Burcham, Timothy S.; Osuga, David T.; Yeh, Yin; Feeney, Robert E.
CS Dep. Food Sci. Technol., Univ. California, Davis, CA, 95616, USA
SO Journal of Biological Chemistry (**1986**), 261(14), 6390-7
CODEN: JBCHA3; ISSN: 0021-9258
DT Journal
LA English
AB This study 1st surveys the **antifreeze** activity of the various **antifreeze** components from both Pagothenia borchgrevinki and the arginine-containing **antifreeze glycoprotein** from Eleginus gracilis (EgAF). All **antifreeze glycoproteins** (AFGP) components examined have a plateau in activity at high concentration, but the actual value of the plateau activity differs between the different length AFGP components and between AFGP and EgAF. Whereas the low-mol.-weight components of both AFGP and EgAF lose activity at deep supercooling, at high concentration activity is restored. The activity data is then shown to fit a reversible kinetic model of AFGP activity, and the coeffs. obtained are used to compare the activity differences between AFGP components and between AFGP and EgAF. The model is also shown to describe the activity of the **antifreeze protein** of the fish Pseudopleuronectes americanus and the **thermal hysteresis protein** of the insect **Tenebrio molitor.**

L90 ANSWER 82 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1985:467024 HCAPLUS
DN 103:67024
TI Direct evidence for **antifreeze glycoprotein** adsorption onto an **ice** surface

AU Brown, Robert A.; Yeh, Yin; Burcham, Timothy S.; Feeney, Robert E.
CS Dep. Appl. Sci., Univ. California, Davis, CA, 95616, USA
SO Biopolymers (**1985**), 24(7), 1265-70
CODEN: BIPMAA; ISSN: 0006-3525
DT Journal
LA English
AB Enhanced surface-second-harmonic generation (SSHG) was observed in the presence of an active **antifreeze glycoprotein** (**AFGP**) **solution** in contact with a pure single **crystal** of **ice.** The enhancement of SSHG is a pos. indication that active **AFGP** mols. adsorb to the surface of **ice crystals.**

L90 ANSWER 83 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1985:21651 HCAPLUS
DN 102:21651
TI Further studies on the involvement of the circadian system in photoperiodic control of **antifreeze protein** production in the beetle Dendroides canadensis
AU **Horwath, Kathleen L.**; Duman, John G.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Journal of Insect Physiology (**1984**), 30(12), 947-55
CODEN: JIPHAF; ISSN: 0022-1910
DT Journal
LA English
AB D. canadensis Larvae were exposed to environmental light cycle periods close to the period length of the endogenous circadian oscillator. The following light cycles were employed: light/dark 8/13, 8/14, 8/16, 8/18, and 8/19 corresponding to period lengths of 21, 22, 24, 26, and 27 h, resp. Larvae maintained in cycles ≤24 h displayed a characteristic short-day response, showing greater **antifreeze protein** activity than did those measured on the day of collection in late summer. In contrast, a long-day response was observed in larvae maintained under a 26- or 27-h light cycle in that **antifreeze protein** activity did not differ from that measured on the initial collection date. The role of photoperiod and temperature in influencing the photoperiodic timing processes were examined with a series of resonance expts. The 1st group consisted of a 24, 36, 48, 60, or 72-h light cycle, each with an 8-h photophase at temps. of 20 or 17°. Rhythmic increases in **antifreeze protein** levels at intervals of 24 h occurred under both temps. However, the lower temperature displaced the resonance curve in the vertical direction (i.e. increasing percentage population response) and reduced the difference between peaks and troughs on the resonance curve. Resonance expts. incorporating a 14-h photophase resulted in low **antifreeze protein** activity under all conditions except a 36-h light cycle in which a 67% induction was observed Eight-hour resonance expts. were also conducted with D. canadensis collected in early spring to determine whether the circadian system participates in the photoperiodic timing processes influencing the spring termination of **antifreeze protein** production Pos. resonance results were obtained in that only larvae maintained in cycles of 36 and 60 h displayed lower **antifreeze** activity when compared to animals on the initial collection date. The combined results emphasize the involvement of the circadian system in the photoperiodic control of **antifreeze protein** production by D. canadensis during the fall and spring. Furthermore, the induction of **antifreeze protein** production is a function of light cycle and its waveform (photoperiod). Temperature appears to modify the photoperiodic response in some manner involving the photoperiodic time measuring processes. Evidently the photoperiodic response of **antifreeze protein** production by D. canadensis is dependent on the entrainment of the circadian system by the light cycle.

L90 ANSWER 84 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1984:468059 HCAPLUS
DN 101:68059
TI **Antifreeze glycoproteins**: influence of polymer length and **ice crystal** habit on activity
AU Burcham, Timothy S.; Knauf, Michael J.; Osuga, David T.; Feeney, Robert E.; Yeh, Yin
CS Dep. Food Sci. Technol., Univ. California, Davis, CA, 95616, USA
SO Biopolymers (**1984**), 23(7), 1379-95
CODEN: BIPMAA; ISSN: 0006-3525
DT Journal
LA English
AB The effect of the **ice crystalline** habit and the length of the polymer on the ability of the **antifreeze glycoproteins** (**AFGP**) from polar **fish** to depress the **freezing** temperature of H2O was investigated. The low-mol.-weight components of the **glycoproteins**, **AFGP** 6-8, are inactive on nucleation at -6°, whereas a **solution** of large **AFGP** (1-4) is fully functional under the same conditions. The low-mol.-weight components differ from the high-mol.-weight components in that they contain some proline replacing the alanine in the Ala-Ala-Thr-disaccharide polymer unit. In the present expts., **antifreeze** activity was examined in the presence of 2 different **ice crystal** growth habits, and homodimers of **AFGP** 6 and 8 were prepared to investigate the function of polymer length and type on **antifreeze** activity at different degrees of supercooling. **Ice crystal** growth habit and introduction of proline into the polymer unit may be responsible for the loss of activity at deep supercooling (-6°) of **AFGP** 6-8. The loss in the ability of **AFGP** to depress the **freezing** temperature of water at deep supercooling is not solely due to polymer length, as carbodiimide-linked dimers of **AFGP** 6 do not function under these **freezing** conditions. A model of **antifreezing** action based on Langmuirian adsorption of **AFGP** on the **ice** surface and direct competition between H2O and **AFGP** mols. for the incorporation sites in the **ice crystal** lattice is presented.

L90 ANSWER 85 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1984:100238 HCAPLUS
DN 100:100238
TI Photoperiodic and **thermal** regulation of **antifreeze protein** levels in the beetle Dendroides canadensis
AU **Horwath, Kathleen L.**; Duman, John G.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Journal of Insect Physiology (**1983**), 29(12), 907-17
CODEN: JIPHAF; ISSN: 0022-1910
DT Journal
LA English
AB The importance of photoperiod, temperature, and their interaction in controlling the seasonal pattern of hemolymph **antifreeze protein** levels in larvae of the beetle D. canadensis was investigated. A complete photoperiodic response curve for **antifreeze protein** production was generated at 20° with larvae collected in early fall. Individuals exposed to a ≤10-h photoperiod or constant darkness had **antifreeze** levels elevated over those maintained in a ≥11-h photoperiod or constant light. The critical daylength resulting in 50% population response lies between 11 h light:13 h dark and 10 h light:14 h dark. This photoperiodic response was masked at sufficiently low (threshold between 15° and 10°) and high (threshold between 25° and 30°) temps. Partial photoperiodic response curves

(at 17° and 25°) obtained within this specified temperature range indicate that the position of the critical photoperiod (between 10 and 11 h) is stable, whereas the amplitude of the response curve is temperature dependent.
Expts. investigating the mechanisms controlling the spring depletion of **protein antifreeze** levels suggest that both photoperiod and temperature are important. The dominant response of photoperiod in the fall, along with the modifying effects of temperature, are considered to provide the necessary precision to assure adequate **cold** tolerance early in the fall and the flexibility to **protect** the species from yearly variation in weather conditions.

L90 ANSWER 86 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1983:555643 HCAPLUS
DN 99:155643
TI Induction of **antifreeze protein** production by juvenile hormone in larvae of the beetle, Dendroides canadensis
AU **Horwath, Kathleen L.**; Duman, John G.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Journal of Comparative Physiology (**1983**), 151(2), 233-40
CODEN: JRCPA3; ISSN: 0373-0859
DT Journal
LA English
AB Larvae of D. canadensis accumulate **protein antifreezes** during the winter. D. canadensis Which were collected in the early fall, prior to the initiation of **cold** hardening processes, were treated with either 3.3 or 6.6 μg juvenile hormone I topically and maintained for 21 days under normally noninductive acclimation conditions (16 h light/8 h dark, 20°). Hormone-treated animals elevated the levels of **antifreeze protein** in their hemolymph compared to those of controls or animals measured on the day of collection. D. canadensis Treated with the anti-JH compound precocene II (P2) for 24 h at 20 μg/cm2 (a dose below LD50 for behavioral survival) and then maintained under acclimation conditions conducive to **antifreeze protein** production (8 h light/16 h dark, 20°) for 2 wk failed to elevate levels of **antifreeze.** Control animals accumulated **antifreeze protein.** D. canadensis Were also treated with 20 and 150 μg P2/cm2 (a dose below the LD50 for gross survival) followed by acclimation to short (8 h) photoperiod at 10°. All animals receiving the higher P2 dosage failed to elevate **antifreezes**, whereas only 42.9% of the individuals treated with the lower dosage initiated **antifreeze protein** production In contrast, >80% of untreated controls responded to these inductive acclimation conditions by elevating **antifreeze** concns. Thus, juvenile hormone participates in the seasonal control of **antifreeze protein** production in D. canadensis. Since this species does not enter diapause prior to or throughout the winter, this is the 1st evidence establishing a direct hormonal mechanism involved with insect **cold** hardiness.

L90 ANSWER 87 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1982:157658 HCAPLUS
DN 96:157658
TI Purification and composition of **protein antifreezes** with high cysteine contents from larvae of the beetle, **Tenebrio molitor**
AU Patterson, Jean L.; Duman, John G.
CS Biol. Dep., Univ. Notre Dame, South Bend, IN, 46556, USA
SO Journal of Experimental Zoology (**1982**), 219(3), 381-4
CODEN: JEZOAO; ISSN: 0022-104X
DT Journal
LA English

AB Two **antifreeze proteins** with **thermal hysteresis** activity (they depress the f.p. of aqueous **solns.** by a noncolligative mechanism well below the m.p.) were purified from **cold**-acclimated larvae of the beetle, **T. molitor** . Both **proteins** have unusual amino acid compns. consisting of high levels of cysteine (15.4 and 28.0 mol%).

L90 ANSWER 88 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1982:101220 HCAPLUS
DN 96:101220
TI Involvement of the circadian system in photoperiodic regulation of insect **antifreeze proteins**
AU **Horwath, Kathleen L.**; Duman, John G.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Journal of Experimental Zoology (**1982**), 219(2), 267-70
CODEN: JEZOAO; ISSN: 0022-104X
DT Journal
LA English
AB Several species of insects produce **proteins** in the winter that depress the hemolymph **freezing** and supercooling points thereby functioning as **antifreezes.** These **proteins** produce a **thermal hysteresis** (difference between the **freezing** and m.ps.). The environmental and physiol. mechanisms that regulate the seasonal production of **antifreeze proteins** in the beetle, Dendroides canadensis were studied. Larvae collected in early fall from a natural population and acclimated to a short photoperiod (8 h light (L)/16 h dark (D) at 20°, 90% RH) elevated levels of **thermal hysteresis proteins**, whereas those individuals maintained on a long (16L/8D) photoperiod did not. Resonance expts. showed that circadian rhythmicity is involved in the photoperiodic timing mechanism used by Dendroides to control **antifreeze** production Apparently, an important aspect of insect seasonality, i.e., winter hardening, includes complex biol. timing processes of circadian nature.

L90 ANSWER 89 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1982:64429 HCAPLUS
DN 96:64429
TI Purification, composition, and physical properties of a **thermal hysteresis "antifreeze" protein** from larvae of the beetle **Tenebrio molitor**
AU Tomchaney, A. P.; Morris, J. P.; Kang, S. H.; Duman, J. G.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Biochemistry (**1982**), 21(4), 716-21
CODEN: BICHAW; ISSN: 0006-2960
DT Journal
LA English
AB A **thermal hysteresis protein** was purified from cold-acclimated larvae of the beetle, **T. molitor**, by using EtOH fractionation, DEAE ion-exchange chromatog., gel filtration, and high-pressure liquid chromatog. The purified **protein** had a mol. weight of 17,000 daltons and its N-terminus was lysine. The amino acid composition of the **antifreeze protein** contained more hydrophilic amino acids than the fish **antifreezes.** This is consistent with the compns. of previously purified insect **thermal hysteresis proteins.** However, the percentage of hydrophilic amino acids in this Tenebrio **antifreeze protein** was considerably less than that of other insect **thermal hysteresis proteins.** The f.p. depressing activity of the Tenebrio **antifreeze** was less than that of fish **proteins** and **glycoproteins** at low **protein** concns. but was greater at high **protein** concns.

L90 ANSWER 90 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1981:456738 HCAPLUS
DN 95:56738
TI Purification and composition of a **thermal hysteresis** producing **protein** from the milkweed bug, Oncopeltus fasciatus
AU Patterson, Jean L.; Kelly, Thomas J.; Duman, John G.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Journal of Comparative Physiology (**1981**), 142(4), 539-42
CODEN: JRCPA3; ISSN: 0373-0859
DT Journal
LA English
AB A **protein** which produces a **thermal hysteresis** (a difference between the freezing pt and m.ps.) was purified from the hemolymph of the milkweed bug, O. fasciatus. The amino acid composition of the Oncopeltus **thermal hysteresis protein** is somewhat different from that of the larvae of the beetle, **Tenebrio molitor**, which is the only other insect from which such a **protein** has been purified. The major difference between the 2 is the large amount of serine (30.5% of the amino acid residues) and glycine (20.0%) present in the O. fasciatus **protein.** Both insect **proteins** have a composition which consists of .apprx.60% polar amino acids and lacks large amts. of alanine. In these respects, they are quite different from the fish **antifreeze glycoproteins.** The apparent differences in the structure of the **thermal hysteresis proteins** and the **antifreeze glycoproteins** indicates that these **proteins** have evolved independently and therefore offer an interesting example of convergent evolution.

L90 ANSWER 91 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1981:98222 HCAPLUS
DN 94:98222
TI Isolation and characterization of freezing-point-depressing peptides from larvae of **Tenebrio molitor**
AU Schneppenheim, R.; Theede, H.
CS Inst. Meereskd., Univ. Kiel, Kiel, D-2300/1, Fed. Rep. Ger.
SO Comparative Biochemistry and Physiology, Part B: Biochemistry & Molecular Biology (**1980**), 67B(4), 561-8
CODEN: CBPBB8; ISSN: 0305-0491
DT Journal
LA English
AB F.p. depressing **peptides** isolated from **T. molitor** larvae acclimated to low temperature (-1°) showed a **thermal hysteresis** similar to that of **antifreeze glycoproteins** or **proteins** from Antarctic and Arctic fish; however, they differed in composition and mechanism of f.p. depression. A cooperative functioning between single **peptides** was necessary for a high f.p. depressing activity. A high cysteine content was found in the new **peptides** and SS bonds were essential for activity. A high share of hydrophilic amino acids (asparagine, threonine, serine) resulted in a high capacity to bind water. This feature may be important both for the high resistance to dehydration and for protection against freezing.

L90 ANSWER 92 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1981:42905 HCAPLUS
DN 94:42905
TI Isopiestic determination of water binding by **fish antifreeze glycoproteins**
AU Duman, John G.; Patterson, Jean L.; Kozak, John J.; De Vries, Arthur L.
CS Dep. Biol., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Biochimica et Biophysica Acta (**1980**), 626(2), 332-6
CODEN: BBACAQ; ISSN: 0006-3002
DT Journal

LA English
AB The effectiveness of water binding of **fish antifreeze glycoproteins** relative to Hb, cytochrome c, and polyvinylpyrrolidinone was determined by analyzing results obtained in an isopiestic study at 25°. The net weight of water which moved from a **protein**/NaCl aqueous sample to a saturated NaCl reference **solution** increased in the order: **antifreeze glycoprotein**, Hb, polyvinylpyrrolidinone, and cytochrome c. Since, of the **proteins** studies, the **glycoproteins** were least effective in transporting water, the **glycoproteins** are the most effective in binding water under equilibrium conditions at 25°.

L90 ANSWER 93 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1980:143647 HCAPLUS
DN 92:143647
TI The role of **thermal hysteresis** producing **proteins** and **glycoproteins** in **Tenebrio molitor** larvae
AU Patterson, Jean L.
CS Univ. Notre Dame, Notre Dame, IN, USA
SO (**1979**) 98 pp. Avail.: Univ. Microfilms Int., Order No. 8002622 From: Diss. Abstr. Int. B 1980, 40(7), 2961
DT Dissertation
LA English
AB Unavailable

L90 ANSWER 94 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1980:106114 HCAPLUS
DN 92:106114
TI **Antifreeze glycoproteins** from polar **fish.** Effects of **freezing** conditions on cooperative function
AU Mulvihill, Daniel M.; Geoghegan, Kieran F.; Yeh, Yin; DeRemer, Kenneth; Osuga, David T.; Ward, Fred C.; Feeney, Robert E.
CS Dep. Food Sci. Technol., Univ. California, Davis, CA, 95616, USA
SO Journal of Biological Chemistry (**1980**), 255(2), 659-62 CODEN: JBCHA3; ISSN: 0021-9258
DT Journal
LA English
AB **Antifreeze glycoproteins** and **glycopeptides** that function noncolligatively contribute 1/3 of the **freezing** temperature depression in the blood serum of some polar **fishes** and enable them to survive at low temps. (-1.9°). There were ≥8 closely related **glycoproteins** and **glycopeptides** ranging in mol. weight from 32,000 to 2600 and numbered 1 to 8 in order of decreasing size. Under conditions of negligible supercooling, the **glycopeptides** had weaker **antifreeze** activity than did the **glycoproteins** (20% on a weight basis or 5% on a molar basis); in mixts. of both , their activities were additive. When nucleation was initiated in supercooled **solns.** (-4 to -5°), the **glycopeptides** were inactive, whereas the **glycoproteins** still showed activity; when mixts. of both were nucleated in supercooled **solns.**, cooperative potentiation occurred, and the full activities of the **glycopeptides** were found. On nucleation of supercooled **solns.** of the **glycoprotein** alone or of the mixts., the temperature rose above the **freezing** temperature (overshoots) to an extent dependent on the extent of supercooling; the temperature of the sample then decreased to form a plateau at the true **freezing** temperature

L90 ANSWER 95 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1980:38064 HCAPLUS
DN 92:38064
TI Composition of a **protein antifreeze** from larvae of the beetle, **Tenebrio molitor**

AU Patterson, Jean L.; Duman, John G.
CS Biol. Dep., Univ. Notre Dame, Notre Dame, IN, 46556, USA
SO Journal of Experimental Zoology (**1979**), 210(2), 361-7
CODEN: JEZOAO; ISSN: 0022-104X
DT Journal
LA English
AB A **thermal hysteresis**-producing **antifreeze protein** was isolated from larvae of **T. molitor** . This is the 1st **thermal hysteresis protein** purified from an insect. The specific activity of the Tenebrio **antifreeze** was somewhat greater than that of fish. The composition of the Tenebrio **protein** was quite different from those of the fish **protein antifreezes.** The most obvious difference was the lack of a large alanine component in the Tenebrio **antifreeze** .

L90 ANSWER 96 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1976:473747 HCAPLUS
DN 85:73747
TI Compartmentalization of sodium chloride in **frozen solutions** of **antifreeze glycoproteins**
AU Lin, Y.; Raymond, J. A.; Duman, J. G.; DeVries, A. L.
CS Scripps Inst. Oceanogr., Univ. California, La Jolla, CA, USA
SO Cryobiology (**1976**), 13(3), 334-40
CODEN: CRYBAS; ISSN: 0011-2240
DT Journal
LA English
AB The **freezing** behavior of NaCl **solns.** containing **antifreeze glycoproteins** from an Antarctic **fish** was investigated to determine whether the **glcoproteins** prevent concentration of NaCl during **freezing.** **Frozen** NaCl **solns.** containing **glycoproteins** exhibited greater resistance to releasing their brine during centrifugation than NaCl **solns.** containing other **cryoprotectants.** With the aid of calorimetry this was shown to be caused not by an incorporation of the NaCl into the **ice** but by compartmentalization of the brine pockets. The compartmentalization was attributed to an unusual spicular structure that was imposed on the **ice** by **glycoproteins.**

L90 ANSWER 97 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1976:415636 HCAPLUS
DN 85:15636
TI Raman spectra of a solid **antifreeze glycoprotein** and its liquid and **frozen** aqueous **solutions**
AU Tomimatsu, Yoshio; Scherer, James R.; Yeh, Yin; Feeney, Robert E.
CS West. Reg. Res. Cent., ARS, Berkeley, CA, USA
SO Journal of Biological Chemistry (**1976**), 251(8), 2290-8
CODEN: JBCHA3; ISSN: 0021-9258
DT Journal
LA English
AB Raman spectroscopy was used to study the anomalous decrease in the **freezing** temperature of water produced by an **antifreeze glycoprotein** obtained from the sera of an Antarctic **fish** . An active fraction of this **glycoprotein** has a mol. weight of .apprx.18,000 by equilibrium sedimentation compared to an apparent weight of 20 by **freezing** temperature depression. The Raman spectra of water present in a 1% **antifreeze glycoprotein solution** and of **ice frozen** from this **solution** were indistinguishable from the spectra of pure water and **ice**, resp. Thus, the bulk properties of water and **ice** are unaffected by the presence of the **antifreeze glycoprotein.** Raman measurements on **ice** grown slowly, using as seed an oriented

single **crystal** of **ice** in contact with 1% **glycoprotein solns.**, showed that the active **glycoprotein** was not excluded from the **ice** phase. On the other hand, a smaller, inactive **glycoprotein** was excluded. Comparison of the Raman spectra of active and inactive **glycoprotein** components as solids, in 5% **solns.**, and rapidly **frozen** 5% **solns.**, showed that the 2 components differ in conformation and possibly in the environment of their carbohydrate hydroxyls. These observations suggest that H bonding of the carbohydrate hydroxyls of the active **glycoprotein** at the **ice-solution** interface may phys. prevent growth of the **ice** lattice.

L90 ANSWER 98 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1973:475121 HCAPLUS
DN 79:75121
TI **Freezing** behavior of **fish** blood **glycoproteins** with **antifreeze** properties
AU Raymond, J. A.; DeVries, A. L.
CS Scripps Inst. Oceanogr., Univ. California, La Jolla, CA, USA
SO Cryobiology (**1972**), 9(6), 541-7
CODEN: CRYBAS; ISSN: 0011-2240
DT Journal
LA English
AB The blood of some species of antarctic **fishes** contains **freezing** point-depressing **glycoproteins**, ranging in mol. weight from 300 to 34,000 daltons. In aqueous **solns.** undergoing **freezing**, the **glycoproteins** of T rematomus borchgrevinki and Dissostichus mawsoni were incorporated into the **ice** in a concentration identical to that in the liquid The **freezing** point depression (fpd) was related to the size of the **glycoprotein**, and for the smaller sizes, was also dependent on the rate of **freezing.** Supercooling of the serum in the presence of an **ice** seed was also observed Thus, the fpd caused by the **glycoproteins** is a noncolligative property. A mechanism for the fpd involving surface effects on **ice** is suggested.

L90 ANSWER 99 OF 99 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1973:450919 HCAPLUS
DN 79:50919
TI Depression of **freezing** point by **glycoproteins** from an Antarctic **fish**
AU Feeney, R. E.; Hofmann, R.
CS Lab. Festkoerperphys., Eidg. Tech. Hochsch., Zurich, Switz.
SO Nature (London, United Kingdom) (**1973**), 243(5406), 357-9
CODEN: NATUAS; ISSN: 0028-0836
DT Journal
LA English
AB Using the blood sera of 2 species of Antarctic **fish**, Trematous borchgrevinki and Dissostichus mawsoni, the rates of development of **ice crystals** and possible equilibria between the **ice crystals** and aqueous phases were examined, using differential **thermal** analysis (DTA) and direct microscopic observations of **freezing** and melting, resp. The **antifreeze glycoproteins** (**AFGP**) were purified from T. borchgrevinki serum. **Ice** formed in a **solution** of **AFGP** seemed to be normal **ice**, i.e., it melted at 0°. **Freezing** and melting of **AFGP solns** . occurred at rates similar to those at which water **freezes** and melts when equivalent amts. of **heat** were applied or removed at the resp. melting or **freezing** temps. Thus there was no evidence indicating a comparatively rapid development of **crystals** in **AFGP solns.** It was not possible to prove a mechanism

involving nucleation from the DTA expts. on kinetic effects. There were no unusual supercooling effects as are commonly found in **solns.** in which initiation of **freezing** is very slow in the absence of **crystals.** There is no significant kinetic effect involved in the overall **freezing** mechanism. Models are discussed.

=> => fil biosis
FILE 'BIOSIS' ENTERED AT 10:41:49 ON 04 AUG 2004

FILE COVERS 1969 TO DATE.
CAS REGISTRY NUMBERS AND CHEMICAL NAMES (CNs) PRESENT
FROM JANUARY 1969 TO DATE.

RECORDS LAST ADDED: 29 July 2004 (20040729/ED)

FILE RELOADED: 19 October 2003.

=> d all tot l107

L107 ANSWER 1 OF 8 BIOSIS
AN **1993:111461** BIOSIS
DN **PREV199344053861**
TI Histochemistry and **antifreeze protein** activity of early primary cultures of cells derived from the fat body of Tenebrio molitor.
AU **Easton, C. M.; Horwath, K. L.**
CS Dep. Biol. Sci., Univ. Cent. Binghamton, State Univ. N.Y., Binghamton, N.Y. 13902-6000, USA
SO Cryobiology, (1992) Vol. 29, No. 6, pp. 729.
Meeting Info.: Twenty-ninth Annual Meeting of the Society for Cryobiology. Ithaca, New York, USA. June 14-19, 1992.
CODEN: CRYBAS. ISSN: 0011-2240.
DT Conference; (Meeting)
LA English
ED Entered STN: 16 Feb 1993
Last Updated on STN: 16 Feb 1993
CC General biology - Symposia, transactions and proceedings 00520
Microscopy - Histology and histochemistry 01056
Cytology - Animal 02506
Biochemistry studies - General 10060
Biochemistry studies - Proteins, peptides and amino acids 10064
Biophysics - Molecular properties and macromolecules 10506
External effects - Temperature as a primary variable - cold 10616
Anatomy and Histology - Microscopic and ultramicroscopic anatomy 11108
Metabolism - Proteins, peptides and amino acids 13012
Bones, joints, fasciae, connective and adipose tissue - Physiology and biochemistry 18004
Temperature - General measurement and methods 23001
Temperature - Cryobiology 23004
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
Invertebrate body regions - Special organs 64218
IT Major Concepts
Biochemistry and Molecular Biophysics; Cell Biology; Metabolism; Methods and Techniques; Morphology; Physiology; Skeletal System (Movement and Support)
IT Miscellaneous Descriptors
ABSTRACT; CRYOBIOLOGY
ORGN Classifier
Coleoptera 75304
Super Taxa

Insecta; Arthropoda; Invertebrata; Animalia
Organism Name
Tenebrio molitor
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L107 ANSWER 2 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1991:131136** BIOSIS
DN **PREV199140062821; BR40:62821**
TI **ANTIFREEZE PROTEIN** PRODUCTION IN PRIMARY CELL CULTURES OF TENEBRIO-MOLITOR FAT BODY.
AU **EASTON C** [Reprint author]; **HORWATH K O**
CS CENT CRYOBIOL RES, STATE UNIV NY, BINGHAMTON, NY 13901, USA
SO Cryobiology, (1990) Vol. 27, No. 6, pp. 660-661.
Meeting Info.: TWENTY-SEVENTH ANNUAL MEETING OF THE SOCIETY FOR CRYOBIOLOGY AND THE CRYOGENIC SOCIETY OF AMERICA, BINGHAMTON, NEW YORK, USA, JUNE 17-23, 1990. CRYOBIOLOGY.
CODEN: CRYBAS. ISSN: 0011-2240.
DT Conference; (Meeting)
FS BR
LA ENGLISH
ED Entered STN: 7 Mar 1991
Last Updated on STN: 7 Mar 1991
CC General biology - Symposia, transactions and proceedings 00520
Cytology - Animal 02506
Biochemistry studies - Proteins, peptides and amino acids 10064
Biochemistry studies - Lipids 10066
External effects - Temperature as a primary variable - cold 10616
Metabolism - Proteins, peptides and amino acids 13012
Bones, joints, fasciae, connective and adipose tissue - Physiology and biochemistry 18004
Temperature - General measurement and methods 23001
Temperature - Cryobiology 23004
Temperature - Thermoregulation 23012
Tissue culture, apparatus, methods and media 32500
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Cell Biology; Metabolism; Physiology; Skeletal System (Movement and Support)
IT Miscellaneous Descriptors
ABSTRACT CRYOBIOLOGY
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L107 ANSWER 3 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1991:131135** BIOSIS
DN **PREV199140062820; BR40:62820**
TI REGULATION OF INSECT **COLD** HARDINESS AN IN-VITRO APPROACH.
AU **HORWATH K L** [Reprint author]
CS CENT CRYOBIOL RES, STATE UNIV NEW YORK, BINGHAMTON, NY 13901, USA
SO Cryobiology, (1990) Vol. 27, No. 6, pp. 660.
Meeting Info.: TWENTY-SEVENTH ANNUAL MEETING OF THE SOCIETY FOR CRYOBIOLOGY AND THE CRYOGENIC SOCIETY OF AMERICA, BINGHAMTON, NEW YORK, USA, JUNE 17-23, 1990. CRYOBIOLOGY.
CODEN: CRYBAS. ISSN: 0011-2240.
DT Conference; (Meeting)
FS BR
LA ENGLISH

ED Entered STN: 7 Mar 1991
Last Updated on STN: 7 Mar 1991
CC General biology - Symposia, transactions and proceedings 00520
Ecology: environmental biology - Bioclimatology and biometeorology 07504
Ecology: environmental biology - Animal 07508
Biochemistry methods - Proteins, peptides and amino acids 10054
Biochemistry studies - Proteins, peptides and amino acids 10064
External effects - Temperature as a primary variable - cold 10616
Metabolism - Proteins, peptides and amino acids 13012
Temperature - General measurement and methods 23001
Temperature - Cryobiology 23004
Temperature - Thermoregulation 23012
In vitro cellular and subcellular studies 32600
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Climatology (Environmental Sciences); Ecology (Environmental Sciences); Metabolism; Physiology
IT Miscellaneous Descriptors
ABSTRACT DENDROIDES-CANADENSIS TENEBRIO-MOLITOR **ANTIFREEZE PROTEIN** CRYOBIOLOGY
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L107 ANSWER 4 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 1986:369167 BIOSIS
DN PREV198631064441; BR31:64441
TI CONTROL OF GROWTH AND DIFFERENTIATION OF THE DERMAL GLANDS VERSON'S GLANDS OF MANDUCA-SEXTA.
AU **HORWATH K L** [Reprint author]; RIDDIFORD L M
CS UNIV WASH, SEATTLE, WA 98195, USA
SO Journal of Cellular Biochemistry Supplement, (1986) No. 10 PART C, pp. 82.
Meeting Info.: SYMPOSIUM ON MOLECULAR ENTOMOLOGY HELD AT THE 15TH ANNUAL MEETING OF THE UCLA (UNIVERSITY OF CALIFORNIA-LOS ANGELES) SYMPOSIA ON MOLECULAR AND CELLULAR BIOLOGY, MAR. 20-APR. 6, 1986. J CELL BIOCHEM SUPPL.
ISSN: 0733-1959.
DT Conference; (Meeting)
FS BR
LA ENGLISH
ED Entered STN: 12 Sep 1986
Last Updated on STN: 12 Sep 1986
CC General biology - Symposia, transactions and proceedings 00520
Cytology - Animal 02506
Biochemistry studies - Proteins, peptides and amino acids 10064
Metabolism - Proteins, peptides and amino acids 13012
Endocrine - General 17002
Endocrine - Neuroendocrinology 17020
Integumentary system - Physiology and biochemistry 18504
Development and Embryology - Morphogenesis 25508
In vitro cellular and subcellular studies 32600
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
Invertebrate body regions - Special organs 64218
IT Major Concepts
Biochemistry and Molecular Biophysics; Development; Endocrine System (Chemical Coordination and Homeostasis); Integumentary System (Chemical Coordination and Homeostasis); Metabolism; Physiology
IT Miscellaneous Descriptors

ABSTRACT ECDYSIS JUVENILE HORMONE ECDYSTEROID PUPAL **PROTEIN** SYNTHESIS
ORGN Classifier
Lepidoptera 75330
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L107 ANSWER 5 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1985:71554** BIOSIS
DN **PREV198528071554; BR28:71554**
TI **THERMOPERIODIC** REGULATION OF INSECT **ANTIFREEZE PROTEINS.**
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP ZOOL, UNIV WASH, SEATTLE, WA 98105, USA
SO Cryobiology, (1984) Vol. 21, No. 6, pp. 686-687.
Meeting Info.: 21ST ANNUAL MEETING OF THE SOCIETY FOR CRYOBIOLOGY, SAN DIEGO, CALIF., USA, AUG. 21-24, 1984. CRYOBIOLOGY.
CODEN: CRYBAS. ISSN: 0011-2240.
DT Conference; (Meeting)
FS BR
LA RUSSIAN
CC General biology - Symposia, transactions and proceedings 00520
Biochemistry studies - Proteins, peptides and amino acids 10064
External effects - Temperature as a primary variable - cold 10616
Metabolism - Proteins, peptides and amino acids 13012
Temperature - General measurement and methods 23001
Temperature - Cryobiology 23004
Temperature - Thermoadaptation 23010
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Metabolism; Physiology
IT Miscellaneous Descriptors
ABSTRACT DENDROIDES-CANADENSIS
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L107 ANSWER 6 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1984:17350** BIOSIS
DN **PREV198426017350; BR26:17350**
TI THE ROLE OF HEMOLYMPH **PROTEINS** IN THE **COLD** TOLERANCE OF INSECTS.
AU DUMAN J [Reprint author]; **HORWATH K**
CS BIOL DEP, UNIV NOTRE DAME, NOTRE DAME, IN 46556, USA
SO Annu. Rev. Physiol., (1983) pp. P261-270. BERNE, R. M. (ED.). ANNUAL REVIEW OF PHYSIOLOGY, VOL. 45. XIV+710P. ANNUAL REVIEWS, INC.: PALO ALTO, CALIF., USA. ILLUS.
Publisher: Series: Annual Review of Physiology.
CODEN: ARPHAD. ISSN: 0066-4278. ISBN: 0-8243-0345-8.
DT Book
FS BR
LA ENGLISH
CC Biochemistry studies - Proteins, peptides and amino acids 10064
Biophysics - Molecular properties and macromolecules 10506
External effects - Temperature as a primary variable - cold 10616
Physiology - Comparative 12003
Metabolism - Proteins, peptides and amino acids 13012

Temperature - Cryobiology 23004
Temperature - Thermopathology 23007
Invertebrata: comparative, experimental morphology, physiology and pathology - Arthropoda: chelicerata 64060
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Metabolism; Pathology; Physiology
IT Miscellaneous Descriptors
REVIEW TENEBRIO-MOLITOR MERACANTHA-CONTRACTA PARCOBLATTA-PENNSYLVANICA ONCOPELTUS-FASCIATUS BOREUS-WESTWOODI ULOMA-IMPRESSA DENDROIDES-CANADENSIS PHILODROMUS VESPULA-MACULATA FISH **THERMAL** HYSTERESIS **PROTEIN** ICE NUCLEATOR **PROTEIN**
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates
ORGN Classifier
Heteroptera 75322
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates
ORGN Classifier
Hymenoptera 75326
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates
ORGN Classifier
Mecoptera 75334
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates
ORGN Classifier
Arachnida 75402
Super Taxa
Chelicerata; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Chelicerates, Invertebrates
ORGN Classifier
Pisces 85200
Super Taxa
Vertebrata; Chordata; Animalia
Taxa Notes
Animals, Chordates, Fish, Nonhuman Vertebrates, Vertebrates

L107 ANSWER 7 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1983:83441** BIOSIS
DN **PREV198325008441; BR25:8441**
TI CONTROL OF PHOTOPERIODICALLY INDUCED **ANTIFREEZE PROTEIN** PRODUCTION IN THE **COLD** HARDY BEETLE DENDROIDES-CANADENSIS.
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP BIOL, UNIV NOTRE DAME, NOTRE DAME, IN 46556, USA
SO Federation Proceedings, (1983) Vol. 42, No. 3, pp. ABSTRACT 1038.
Meeting Info.: 67TH ANNUAL MEETING OF THE FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY, CHICAGO, ILL., USA, APRIL 10-15, 1983. FED PROC.
CODEN: FEPRA7. ISSN: 0014-9446.
DT Conference; (Meeting)
FS BR

LA ENGLISH
CC General biology - Symposia, transactions and proceedings 00520
Behavioral biology - Animal behavior 07003
Circadian rhythms and other periodic cycles 07200
Ecology: environmental biology - Bioclimatology and biometeorology 07504
Biochemistry studies - General 10060
Biochemistry studies - Lipids 10066
External effects - Light and darkness 10604
Endocrine - Neuroendocrinology 17020
Temperature - Cryobiology 23004
Temperature - Thermoadaptation 23010
Development and Embryology - Morphogenesis 25508
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Behavior; Biosynchronization; Endocrine System (Chemical Coordination and Homeostasis); Physiology
IT Miscellaneous Descriptors
ABSTRACT WINTER CIRCADIAN RHYTHM JUVENILE HORMONE PRECOCENE DIAPAUSE
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L107 ANSWER 8 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1982:72910** BIOSIS
DN **PREV198223002902; BR23:2902**
TI CIRCADIAN REGULATION OF INSECT DENDROIDES-CANADENSIS **ANTIFREEZE PROTEINS.**
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP BIOL, UNIV NOTRE DAME, NOTRE DAME, INDIANA, USA
SO Cryobiology, (1981) Vol. 18, No. 6, pp. 615.
Meeting Info.: 18TH ANNUAL MEETING OF THE SOCIETY FOR CRYOBIOLOGY, ST. LOUIS, MO., USA, JUNE 14-18, 1981. CRYOBIOLOGY.
CODEN: CRYBAS. ISSN: 0011-2240.
DT Conference; (Meeting)
FS BR
LA ENGLISH
CC General biology - Symposia, transactions and proceedings 00520
Circadian rhythms and other periodic cycles 07200
Ecology: environmental biology - Animal 07508
Biochemistry studies - Proteins, peptides and amino acids 10064
External effects - Light and darkness 10604
External effects - Temperature as a primary variable - cold 10616
Metabolism - Proteins, peptides and amino acids 13012
Temperature - General measurement and methods 23001
Temperature - Cryobiology 23004
Temperature - Thermoadaptation 23010
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Biochemistry and Molecular Biophysics; Biosynchronization; Ecology (Environmental Sciences); Physiology
IT Miscellaneous Descriptors
ABSTRACT PHOTOPERIOD
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

=> d all tot l108

L108 ANSWER 1 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **2003:360784** BIOSIS
DN **PREV200300360784**
TI A serendipitous discovery of **antifreeze protein** -specific activity in C-linked **antifreeze glycoprotein** analogs.
AU Eniade, Adewale; Purushotham, Madhusudhan; Ben, Robert N. [Reprint Author]; Wang, J. B.; **Horwath, Kathleen**
CS Department of Chemistry, State University of New York at Binghamton, Binghamton, NY, 13902, USA
SO Cell Biochemistry and Biophysics, (2003) Vol. 38, No. 2, pp. 115-124. print.
ISSN: 1085-9195.
DT Article
LA English
ED Entered STN: 6 Aug 2003
Last Updated on STN: 6 Aug 2003
AB Structurally diverse carbon-linked (C-linked) analogs of **antifreeze glycoprotein** (AFGP) have been prepared via linear or convergent solid phase synthesis. These analogs range in molecular weight from approx 1.5-4.1 KDa and do not possess the beta-D-galactose-1,3-alpha-D-N-acetylgalactosamine carbohydrate moiety or the L-threonine-L-alanine-L-alanine **polypeptide** backbone native to the AFGP wild-type. Despite these dramatic structural modifications, the 2.7-KDa and 4.1-KDa analogs possess **antifreeze protein**-specific activity as determined by recrystallization-inhibition (RI) and **thermal** hysteresis (TH) assays. These analogs are weaker than the wild-type in their activity, but nanoliter osmometry indicates that these compounds are binding to ice and affecting a localized **freezing** point depression. This is the first example of a C-linked AFGP analog that possesses TH and RI activity and suggests that the rational design and synthesis of chemically and biologically stable AFGP analogs is a feasible and worthwhile endeavor. Given the low degree of TH activity, these compounds may prove useful for the protection of cells during **freezing** and thawing cycles.
CC Biochemistry studies - General 10060
IT Major Concepts
Biochemistry and Molecular Biophysics; Methods and Techniques
IT Chemicals & Biochemicals
C-linked **antifreeze glycoprotein** analogs; L-lysine; L-threonine; **antifreeze glycoproteins**; **antifreeze protein**; carbon; glycine; glycoconjugate
IT Methods & Equipment
recrystallization: laboratory techniques
IT Miscellaneous Descriptors
antifreeze protein-specific activity: serendipitous discovery; **freezing** cycles; thawing cycles; **thermal** hysteresis
RN 56-87-1 (L-lysine)
72-19-5 (L-threonine)
7440-44-0 (carbon)
56-40-6 (glycine)

L108 ANSWER 2 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1996:538806** BIOSIS
DN **PREV199699261162**
TI Tracking the profile of a specific **antifreeze protein** and its contribution to the **thermal** hysteresis activity in **cold** hardy insects.

AU **Horwath, Kathleen L.** [Reprint author]; **Easton, Christopher M.**; Poggioli., George J., Jr.; Myers, Kevin; Schnorr, Ingrid L.
CS Dep. Biol. Sci., Binghamton Univ., Binghamton, NY 13902-6000, USA
SO European Journal of Entomology, (1996) Vol. 93, No. 3, pp. 419-433. ISSN: 1210-5759.
DT Article
LA English
ED Entered STN: 10 Dec 1996
Last Updated on STN: 10 Dec 1996
AB This study summarizes some important new directions in research on **antifreeze protein** biosynthesis and regulation. It describes the recent development and availability of essential biochemical and cellular tools that make possible more direct cellular investigations, and an assessment of the relationship between **thermal** hysteresis **protein** (THP) levels and **antifreeze** activity (both **thermal** hysteresis and recrystallization inhibition (RI)). These tools include: 1) the isolation of a specific THP of high activity (designated Tm 12.86), and an additional endogenous activating factor of this **antifreeze protein**; 2) the ability to track the cellular and secretory patterns of Tm 12.86 immunologically; 3) the use of an in vitro fat body cell culture system for direct investigation of cellular events. and, 4) a means of quantifying RI behavior of purified Tm 12.86, and samples of unknown concentrations of THPs, to provide a more sensitive detection method for **antifreeze** activity at scaled down values associated with the in vitro system. In combination, these studies indicate that the adaptation mechanisms contributing to the overall **antifreeze protein** response in a **cold** hardy insect involves a complex interaction between **antifreeze proteins** and endogenous activators of these **proteins.** With the availability of these key tools, the details of a precise and seasonal regulation of these **antifreeze protein** /activator interactions, which ultimately generate an efficient **cold** hardy response, now have the potential to be worked out.
CC Ecology: environmental biology - Bioclimatology and biometeorology 07504
Ecology: environmental biology - Animal 07508
External effects - Temperature as a primary variable - cold 10616
Metabolism - Proteins, peptides and amino acids 13012
Temperature - Thermotherapy 23005
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Climatology (Environmental Sciences); Ecology (Environmental Sciences); Metabolism; Pathology; Physiology
IT Miscellaneous Descriptors
ADAPTATION MECHANISM; **ANTIFREEZE** ACTIVITY; BIOCHEMISTRY AND BIOPHYSICS; BIOSYNTHESIS; **COLD** HARDINESS; RECRYSTALLIZATION INHIBITION; **THERMAL** HYSTERESIS; **THERMAL** HYSTERESIS **PROTEIN**
ORGN Classifier
Insecta 75300
Super Taxa
Arthropoda; Invertebrata; Animalia
Organism Name
insect
Insecta
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L108 ANSWER 3 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1994:359565** BIOSIS
DN **PREV199497372565**
TI Characterization of primary cell cultures derived from fat body of the beetle, Tenebrio molitor, and the immunolocalization of a **thermal**

hysteresis **protein** in vitro.
AU **Easton, Christopher M.; Horwath, Kathleen L.** [Reprint author]
CS Dep. Biol. Sci., Binghamton Univ., Binghamton, NY 13902-6000, USA
SO Journal of Insect Physiology, (1994) Vol. 40, No. 6, pp. 537-547. CODEN: JIPHAF. ISSN: 0022-1910.
DT Article
LA English
ED Entered STN: 23 Aug 1994
Last Updated on STN: 24 Aug 1994
AB A cell culture system was developed for Tenebrio molitor fat body to investigate the regulation of **thermal** hysteresis **protein** (THP) production. To establish the reliability of this system we compared the histology and THP distribution of cultured fat body cells to the features of intact tissue. Cell cultures established from fat body contained three major cell types: globular, stellate and rounded cells. Globular cells resembled mature trophocytes of in vivo fat body. They contained large lipid vesicles, **protein** granules, and extensive glycogen stores. Stellate and rounded cells lacked **protein** granules, and contained varying amounts of lipids and glycogen. THPs were localized in the cytoplasm of cultured cells, associated with **protein**-containing granules in globular cells, or within discrete vesicles in the other cell types. In intact fat body, THPs were primarily localized to the accumulated **protein** granules. These results are the first to suggest that there is intracellular storage of THPs in the fat body. Such storage provides the potential for later mobilization during periods of low temperature and/or desiccation. Furthermore, our fat body primary cultures morphologically and functionally resemble their in vivo counterparts and will be useful in addressing questions about the regulation of THP synthesis and secretion by insect fat body.
CC Cytology - Animal 02506
Ecology: environmental biology - Bioclimatology and biometeorology 07504
Biochemistry studies - Proteins, peptides and amino acids 10064
Biochemistry studies - Lipids 10066
Biochemistry studies - Carbohydrates 10068
Metabolism - Proteins, peptides and amino acids 13012
Bones, joints, fasciae, connective and adipose tissue - Physiology and biochemistry 18004
Immunology - General and methods 34502
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
Invertebrate body regions - Special organs 64218
IT Major Concepts
Cell Biology; Climatology (Environmental Sciences); Immune System (Chemical Coordination and Homeostasis); Metabolism; Physiology; Skeletal System (Movement and Support)
IT Chemicals & Biochemicals
GLYCOGEN
IT Miscellaneous Descriptors
GLYCOGEN; LIPID; OVERWINTERING ADAPTATION; **PROTEIN** SYNTHESIS; TROPHOCYTE
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Organism Name
Tenebrio molitor
Taxa Notes
Animals, Arthropods, Insects, Invertebrates
RN 9005-79-2 (GLYCOGEN)

L108 ANSWER 4 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 1989:73933 BIOSIS

DN PREV198987038331; BA87:38331
TI STAGE AND SEGMENT SPECIFICITY OF THE SECRETORY CELL OF THE DERMAL GLANDS OF THE TOBACCO HORNWORM MANDUCA-SEXTA.
AU **HORWATH K L** [Reprint author]; RIDDIFORD L M
CS DEP BIOLOGICAL SCI, STATE UNIV NEW YORK, BINGHAMTON, NY 13901, USA
SO Developmental Biology, (1988) Vol. 130, No. 1, pp. 365-373.
CODEN: DEBIAO. ISSN: 0012-1606.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 23 Jan 1989
Last Updated on STN: 23 Jan 1989
AB The pair of epidermally derived Verson's glands on each segment of the tobacco hornworm, Manduca sexta, secretes at ecdysis **proteinaceous** products which coat the epicuticle. These **proteins** are produced by a single secretory cell which displays both stage- and segment-specificity during development. Three major 12-kDa **polypeptides** are synthesized at the larval molts, while higher molecular weight (14-93 kDa) **polypeptides** are produced at the pupal molt. In the pupa, but not in the larva, there are three segment-specific **protein** patterns, each involving both qualitative and quantitative differences: (1) thoracic (T) segments 1 and 2; (2) T3 and abdominal (A) segment 1; (3) A2-A8. Larval-specific **proteins** were found to be synthesized in low amounts throughout the penultimate fourth instar, with enhanced synthesis occurring during the molt, coincident with the molting surge of ecdysteroids. Synthesis of the major pupal products commenced about the time of wandering, with enhanced synthesis occurring throughout prepupal development, coincident with the prepupal surge in ecdysteroids. The onset of synthesis of the major pupal products differed, both within and between segments. Culture of fifth instar Day 2 glands in vitro showed that this synthesis depended on 20-hydroxyecdysone. The differential regulation within and between segments observed in vivo was also seen in vitro.
CC Cytology - Animal 02506
Genetics - Animal 03506
Biochemistry studies - Sterols and steroids 10067
Metabolism - Proteins, peptides and amino acids 13012
Endocrine - Neuroendocrinology 17020
Integumentary system - Physiology and biochemistry 18504
Development and Embryology - Morphogenesis 25508
In vitro cellular and subcellular studies 32600
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
Invertebrate body regions - Hard parts 64214
IT Major Concepts
Cell Biology; Development; Endocrine System (Chemical Coordination and Homeostasis); Genetics; Integumentary System (Chemical Coordination and Homeostasis); Metabolism; Physiology
IT Miscellaneous Descriptors
DEVELOPMENT 20 HYDROXYECDYSONE ECDYSIS DIFFERENTIAL REGULATION **PROTEIN** SECRETION EPICUTICLE IN-VITRO TISSUE CULTURE
ORGN Classifier
Lepidoptera 75330
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates
RN 5289-74-7 (20-HYDROXYECDYSONE)

L108 ANSWER 5 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1986:455506** BIOSIS
DN **PREV198682112348; BA82:112348**
TI **THERMOPERIODIC** INVOLVEMENT IN **ANTIFREEZE**

PROTEIN PRODUCTION IN THE **COLD** HARDY BEETLE
DENDROIDES-CANADENSIS IMPLICATIONS FOR PHOTOPERIODIC TIME MEASUREMENT.
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP ZOOL, NJ-15, UNIV WASH, SEATTLE, WASH 98195, USA
SO Journal of Insect Physiology, (1986) Vol. 32, No. 9, pp. 799-806.
CODEN: JIPHAF. ISSN: 0022-1910.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 21 Nov 1986
Last Updated on STN: 21 Nov 1986
AB This study considers a possible role for **thermoperiods** (i.e. the duration of **thermophase** (T) and cryophase (C) during a 24-h period) in the regulation of **antifreeze protein** production in Dendroides canadensis. Larvae were exposed to **thermocycles** consisting of long (16 h) and short (8 h) **thermophases** in the form T/C, 25°/17° C, while maintained in a background of either constant darkness, or constant light. Short-day **thermoperiods** stimulated, while long-day **thermoperiods** prevented, **antifreeze protein** production under both aperiodic lighting conditions. If the cryophase temperature was allowed to reach 13° C (T/C, 25°/13°), significant differences ($P < 0.001$) between long and short-day **thermoperiodic** responses persisted in both constant light and constant darkness, while the overall levels of **antifreeze protein** production increased under constant light conditions independent of the **thermoperiod.** Studies incorporating conflicting photothermal regimes in the form short photoperiod with a long **thermoperiod**, and vice versa, triggered intermediate **antifreeze protein** activity. These results indicate that D. canadensis are capable of distinguishing long from short-day **thermoperiods**, over the cycling temperature from 25 to 13° C, and will initiate **antifreeze protein** production under the appropriate conditions. Furthermore, the expression of this **thermoperiodic** response under both constant darkness and constant light holds important implications for photoperiodic time measurement in this species by suggesting that the circadian clock involved with daylength measurement is of an internal coincidence type. The observed interaction of the light-cycle and **thermocycle** in the regulation of **antifreeze protein** production is discussed from the perspective of entrainment of the D. canadensis circadian system.
CC Circadian rhythms and other periodic cycles 07200
External effects - Light and darkness 10604
External effects - Temperature as a primary variable 10614
Metabolism - Proteins, peptides and amino acids 13012
Temperature - Thermorhythms 23008
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Biosynchronization; Metabolism; Physiology
IT Miscellaneous Descriptors
CIRCADIAN RHYTHM
ORGN Classifier
Hymenoptera 75326
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L108 ANSWER 6 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1985:279163** BIOSIS
DN **PREV198579059159; BA79:59159**

TI FURTHER STUDIES ON THE INVOLVEMENT OF THE CIRCADIAN SYSTEM IN PHOTOPERIODIC CONTROL OF **ANTIFREEZE PROTEIN** PRODUCTION IN THE BEETLE DENDROIDES-CANADENSIS.

AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP BIOLOGY, UNIV NOTRE DAME, NOTRE DAME, IN 46556, USA

SO Journal of Insect Physiology, (1984) Vol. 30, No. 12, pp. 947-956.
CODEN: JIPHAF. ISSN: 0022-1910.
DT Article
FS BA
LA ENGLISH

AB The role of circadian rhythmicity in the photoperiodic time measuring processes regulating **antifreeze protein** production in D. canadensis was further investigated. Using "T" experiments larvae were exposed to environmental light cycle periods close to the period length of the endogenous circadian oscillator. The following light cycles were employed: light/dark 8/13, 8/14, 8/16, 8/18 and 8/19 corresponding to period lengths of 21, 22, 24, 26 and 27 h. Larvae maintained in cycles ≤ 24 h displayed a characteristic short-day response, showing significantly ($P < 0.01$) greater **antifreeze protein** activity than did those measured on the day of collection in late summer. In contrast, a long-day response was observed in larvae maintained under a 26- or 27-h light cycle in that **antifreeze protein** activity did not differ from that measured on the initial collection date. The role of photoperiod and temperature in influencing the photoperiodic timing processes were examined with a series of resonance experiments. The 1st group consisted of a 24, 36, 48, 60 or 72-h light cycle, each with an 8-h photophase at temperatures of 20° or 17° C. Rhythmic increases in **antifreeze protein** levels at intervals of 24 h occurred under both temperatures. The lower temperature displaced the resonance curve in the vertical direction (i.e., increasing % population response) and reduced the difference between peaks and troughs on the resonance curve. Resonance experiments incorporating a 14-h photophase resulted in low **antifreeze protein** activity under all conditions except a 36-h light cycle in which a 67% induction was observed. Eight hour resonance experiments were conducted with D. canadensis collected in early spring to determine whether the circadian system participates in the photoperiodic timing processes influencing the spring termination of **antifreeze protein** production. Positive resonance results were obtained in that only larvae maintained in cycles of 36 and 60 h displayed significantly ($P < 0.01$) lower **antifreeze** activity when compared to animals on the initial collection date. The combined results emphasize the involvement of the circadian system in the photoperiodic control of **antifreeze protein** production by D. canadensis during the fall and spring. The induction of **antifreeze protein** production is a function of photoperiod. Temperature appears to modify the photoperiodic response in some manner involving the photoperiodic time measuring processes. The photoperiodic response of **antifreeze protein** production by D. canadensis is dependent upon the entrainment of the circadian system by the light cycle.

CC Circadian rhythms and other periodic cycles 07200
Ecology: environmental biology - Bioclimatology and biometeorology 07504
Biochemistry studies - Proteins, peptides and amino acids 10064
External effects - Light and darkness 10604
External effects - Temperature as a primary variable - cold 10616
Metabolism - Proteins, peptides and amino acids 13012
Blood - Blood and lymph studies 15002
Temperature - Thermorhythms 23008
Temperature - Thermoadaptation 23010
Temperature - Thermoregulation 23012
Development and Embryology - General and descriptive 25502
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076

IT Major Concepts
Biosynchronization; Blood and Lymphatics (Transport and Circulation); Climatology (Environmental Sciences); Metabolism; Physiology
IT Miscellaneous Descriptors
ENTRAINMENT
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L108 ANSWER 7 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1984:275323** BIOSIS
DN **PREV198478011803; BA78:11803**
TI YEARLY VARIATIONS IN THE OVER WINTERING MECHANISMS OF THE **COLD** HARDY BEETLE DENDROIDES-CANADENSIS.
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP NEUROBIOL PHYSIOL, HOGAN HALL, NORTHWESTERN UNIV, EVANSTON, ILL 60201, USA
SO Physiological Zoology, (1984) Vol. 57, No. 1, pp. 40-45.
CODEN: PHZOA9. ISSN: 0031-935X.
DT Article
FS BA
LA ENGLISH
AB Successful overwintering by insects is dependent primarily on 1 of 2 modes of adaptation; the ability to survive **freezing** (**freezing** tolerance) and the ability to avoid **freezing** by supercooling (**freezing** susceptibility). Studies on the larvae of the beetle D. canadensis from northern Indiana [USA] during the 1977-1978 and 1978-1979 winters revealed that this species was **freeze** tolerant, exhibiting supercooling points (SCP) between -8.0° to -12.0° C with lethal temperatures (LLT) of -28.0° C. D. canadensis has switched from a **freeze**-tolerant to a **freeze** -susceptible mechanism of overwintering. During the winter of 1981-1982, larvae exhibited extensive supercooling (averaging .apprx. -26.0° C). The LLT corresponded to their SCP temperatures; therefore, they could not tolerate **freezing** at that time. Evidence accumulated during 1979-1980 and 1980-1981 suggests that the switch in overwintering adaptations occurred between these winters. The only notable change in the **cold**-hardening parameters of D. canadensis throughout this time involves the apparent loss of ice nucleating **proteins.** Regardless of the overwintering strategy employed, LLT are similar from year to year. This is the 1st known instance where the overwintering stage of a species has been observed to display both types of adaptations.
CC Ecology: environmental biology - Bioclimatology and biometeorology 07504
Ecology: environmental biology - Animal 07508
Biochemistry studies - Proteins, peptides and amino acids 10064
External effects - Temperature as a primary variable - cold 10616
Temperature - Thermoadaptation 23010
Development and Embryology - Experimental 25504
Development and Embryology - Morphogenesis 25508
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Development; Ecology (Environmental Sciences); Physiology
IT Miscellaneous Descriptors
LARVA **THERMAL** ADAPTATION **FREEZING** TOLERANCE **FREEZING** SUSCEPTIBILITY ICE NUCLEATING **PROTEIN** INDIANA USA/
ORGN Classifier
Coleoptera 75304
Super Taxa

Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L108 ANSWER 8 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1984:251083** BIOSIS
DN **PREV198477084067; BA77:84067**
TI PHOTOPERIODIC AND **THERMAL** REGULATION OF **ANTIFREEZE PROTEIN** LEVELS IN THE BEETLE DENDROIDES-CANADENSIS.
AU **HORWATH K** [Reprint author]; DUMAN J G
CS DEP NEUROBIOL PHYSIOL, HOGAN HALL, NORTHWEST UNIV, EVANSTON, IL 602/1, USA
SO Journal of Insect Physiology, (1983) Vol. 29, No. 12, pp. 907-918.
CODEN: JIPHAF. ISSN: 0022-1910.
DT Article
FS BA
LA ENGLISH
AB The importance of photoperiod, temperature and their interaction in controlling the seasonal pattern of hemolymph **antifreeze protein** levels in larvae of D. canadensis was investigated. A complete photoperiodic response curve for **antifreeze protein** production was generated at 20° C with larvae collected in early fall. Individuals exposed to a 10-h photoperiod or less, including constant darkness, had significantly elevated **antifreeze** levels over those maintained in an 11-h photoperiod or more, including constant light. The critical daylength resulting in 50% population response lies between LD [L = light, D = dark] 11:13 and LD 10:14. This photoperiodic response was masked at sufficiently low (threshold between 15° and 10° C) and high (threshold between 25° and 30° C) temperatures. Partial photoperiodic response curves (at 17° and 25° C) obtained within this specified temperature range indicate that the position of the critical photoperiod (between 10 and 11 h) is stable while the amplitude of the response curve is temperature dependent. Experiments investigating the mechanisms controlling the spring depletion of **protein antifreeze** levels suggest that both photoperiod and tmeperature are important. The dominant response of photoperiod in the fall along with the modifying effects of temperature are considered to provide the necessary precision to assure **cold** tolerance early in the fall and the flexibility to protect the species from yearly variation in weather conditions.
CC Ecology: environmental biology - Bioclimatology and biometeorology 07504
Biochemistry studies - Proteins, peptides and amino acids 10064
External effects - Light and darkness 10604
External effects - Temperature as a primary variable - cold 10616
Metabolism - Proteins, peptides and amino acids 13012
Blood - Blood and lymph studies 15002
Temperature - Cryobiology 23004
Temperature - Thermoadaptation 23010
Development and Embryology - General and descriptive 25502
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Blood and Lymphatics (Transport and Circulation); Metabolism; Physiology
IT Miscellaneous Descriptors
HEMOLYMPH
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L108 ANSWER 9 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1984:194972** BIOSIS
DN **PREV198477027956; BA77:27956**
TI INDUCTION OF **ANTIFREEZE PROTEIN** PRODUCTION BY JUVENILE HORMONE IN LARVAE OF THE BEETLE DENDROIDES-CANADENSIS.
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP BIOL, UNIV NOTRE DAME, NOTRE DAME, INDIANA 46556, USA
SO Journal of Comparative Physiology B Biochemical Systemic and Environmental Physiology, (1983) Vol. 151, No. 2, pp. 233-240.
CODEN: JPBPDL. ISSN: 0174-1578.
DT Article
FS BA
LA ENGLISH
AB Larvae of the beetle D. canadensis accumulate **protein antifreezes** during the winter. D. canadensis which were collected in the early fall, prior to the initiation of **cold** hardening processes, were treated with either 3.3 or 6.6 μg juvenile hormone I topically in acetone and maintained for 21 days under normally non-inductive acclimation conditions (16 light/8 dark, 20° C). Hormone treated animals significantly elevated the levels of **antifreeze protein** in their hemolymph compared to those of acetone treated and untreated controls or animals measured on the day of collection. D. canadensis treated with the anti-JH compound precocene II (P2) in acetone for 24 h at a concentration of 20 μg/cm2 (a dose below LD50 for behavioral survival) and then maintained under acclimation conditions conducive to **antifreeze protein** production (8 light/16 dark, 20° C) for 2 wk failed to elevate levels of **antifreeze.** Acetone treated control animals accumulated a significant concentration of **antifreeze protein.** D. canadensis were also treated with 20 and 150 μg/cm2 P2 (a dose below the LD50 for gross survival) followed by acclimation to short (8 h) photoperiod at 10° C. All animals receiving the higher P2 dosage failed to elevate **antifreezes**, while only 42.9% of the individuals treated with the lower dosage initiated **antifreeze protein** production. In contrast, > 80% of untreated and 70% of acetone treated controls responded to these inductive acclimation conditions by elevating **antifreeze** concentrations. Evidently, juvenile hormone participates in the seasonal control of **antifreeze protein** production in D. canadensis. Since this species does not enter a diapause state prior to or throughout the winter this is the 1st evidence establishing a direct hormonal mechanism involved with insect **cold** hardiness.
CC Circadian rhythms and other periodic cycles 07200
Ecology: environmental biology - Animal 07508
Biochemistry studies - Proteins, peptides and amino acids 10064
Biochemistry studies - Lipids 10066
External effects - Temperature as a primary variable - cold 10616
Pathology - Necrosis 12510
Metabolism - Proteins, peptides and amino acids 13012
Endocrine - Neuroendocrinology 17020
Nervous system - Physiology and biochemistry 20504
Temperature - General measurement and methods 23001
Temperature - Cryobiology 23004
Temperature - Hypothermia and hyperthermia 23006
Temperature - Thermoadaptation 23010
Development and Embryology - General and descriptive 25502
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Development; Endocrine System (Chemical Coordination and Homeostasis); Metabolism; Nervous System (Neural Coordination); Physiology
IT Miscellaneous Descriptors
DIAPAUSE

ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates

L108 ANSWER 10 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1984:194971** BIOSIS
DN **PREV198477027955; BA77:27955**
TI PREPARATORY ADAPTATIONS FOR WINTER SURVIVAL IN THE **COLD** HARDY BEETLES DENDROIDES-CANADENSIS AND DENDROIDES-CONCOLOR.
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP BIOL, UNIV NOTRE DAME, NOTRE DAME, INDIANA 46556, USA
SO Journal of Comparative Physiology B Biochemical Systemic and Environmental Physiology, (1983) Vol. 151, No. 2, pp. 225-232.
CODEN: JPBPDL. ISSN: 0174-1578.
DT Article
FS BA
LA ENGLISH
AB **Thermal** hysteresis (indicative of macromolecular **antifreeze** levels) was measured in hemolymph samples from the beetle, D. canadensis, after acclimation to a short (8 h) photoperiod at 20° C, or long (16 h) photoperiod at temperatures of 10° and 20° C. Both the short photoperiod and low temperature (10° C) treatment caused a significant elevation of **thermal** hysteresis, thereby implicating increased **antifreeze protein** production. Oxygen consumption rates of animals in each acclimation treatment were measured and no significant differences in metabolic rates were noted between treatments when measured at a high (20° C) temperature. Conditions which initiate **antifreeze protein** production fail to induce a diapause condition, characterized by a drop in metabolic rates. Natural populations sampled in mid-winter possess elevated levels of **thermal** hysteresis, and accumulate glycerol and sorbitol, but do not show a depressed metabolic rate. D. canadensis do not enter a diapause during the winter, but are fully capable of achieving a high level of **cold** hardiness through the accumulation of **antifreeze proteins** and polyhydroxy alcohols. The possibility that D. canadensis exhibited metabolic compensation under any acclimation treatment was examined and the results indicated that acclimation to a long photoperiod or low temperature did not affect O2 consumption rates. In contrast, D. canadensis acclimated to a short photoperiod at 20° C displayed considerable metabolic rate adjustments, as indicated by a Q10 of 1.36. D. concolor, a known congener of D. canadensis, also displayed metabolic rate elevation at low temperatures following acclimation to a short photoperiod. For both species, the photoperiodically induced metabolic compensation was effected through a rotation in the metabolism-temperature curve. Evidently, in the absence of a diapause, D. canadensis and D. concolor display metabolic rate compensation in response to seasonally changing photoperiods.
CC Mathematical biology and statistical methods 04500
Circadian rhythms and other periodic cycles 07200
Ecology: environmental biology - Bioclimatology and biometeorology 07504
Ecology: environmental biology - Animal 07508
Biochemistry studies - General 10060
Biochemistry studies - Proteins, peptides and amino acids 10064
Biophysics - Biocybernetics 10515
External effects - Light and darkness 10604
External effects - Temperature as a primary variable - cold 10616
Metabolism - Energy and respiratory metabolism 13003
Metabolism - Proteins, peptides and amino acids 13012
Temperature - General measurement and methods 23001

Temperature - Cryobiology 23004
Temperature - Hypothermia and hyperthermia 23006
Temperature - Thermorhythms 23008
Temperature - Thermoadaptation 23010
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Biosynchronization; Metabolism; Physiology
IT Miscellaneous Descriptors
ANTIFREEZE PROTEIN POLY HYDROXY ALCOHOL GLYCEROL HYSTERESIS PHOTOPERIOD
ORGN Classifier
Coleoptera 75304
Super Taxa
Insecta; Arthropoda; Invertebrata; Animalia
Taxa Notes
Animals, Arthropods, Insects, Invertebrates
RN 56-81-5 (GLYCEROL)

L108 ANSWER 11 OF 11 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN **1982:245410** BIOSIS
DN **PREV198274017890; BA74:17890**
TI INVOLVEMENT OF THE CIRCADIAN SYSTEM IN PHOTOPERIODIC REGULATION OF INSECT **ANTIFREEZE PROTEINS.**
AU **HORWATH K L** [Reprint author]; DUMAN J G
CS DEP OF BIOLOGY, UNIV OF NOTRE DAME, NOTRE DAME, INDIANA 46556, USA
SO Journal of Experimental Zoology, (1982) Vol. 219, No. 2, pp. 267-270. CODEN: JEZOAO. ISSN: 0022-104X.
DT Article
FS BA
LA ENGLISH
AB Several species of insects produce **proteins** in the winter that depress the hemolymph **freezing** and supercooling points, thereby functioning as **antifreezes.** These **proteins** produce a **thermal** hysteresis (difference between the **freezing** and melting points). This study concerns the environmental and physiological mechanisms that regulate the seasonal production of **antifreeze proteins** in the beetle, Dendroides canadensis. Larvae collected in early fall from a natural population and acclimated to a short photoperiod (8L/16D [light/dark] at 20° C, 90% relative humidity) elevated levels of **thermal** hysteresis **proteins** (THP); those individuals maintained on a long (16L/8D) photoperiod did not. Resonance experiments showed that circadian rhythmicity is involved in the photoperiodic timing mechanism used by Dendroides to control **antifreeze** production. An important aspect of insect seasonality, i.e., winter hardening, includes complex biological timing processes of circadian nature.
CC Circadian rhythms and other periodic cycles 07200
Ecology: environmental biology - Bioclimatology and biometeorology 07504
Biochemistry studies - Proteins, peptides and amino acids 10064
External effects - Light and darkness 10604
External effects - Temperature as a primary variable - cold 10616
External effects - Humidity 10620
Metabolism - Proteins, peptides and amino acids 13012
Blood - Blood and lymph studies 15002
Temperature - General measurement and methods 23001
Temperature - Thermoadaptation 23010
Development and Embryology - Experimental 25504
Development and Embryology - Morphogenesis 25508
Invertebrata: comparative, experimental morphology, physiology and pathology - Insecta: physiology 64076
IT Major Concepts
Biosynchronization; Blood and Lymphatics (Transport and Circulation);

```
        Development; Metabolism; Physiology
IT   Miscellaneous Descriptors
        DENDROIDES-CANADENSIS LARVA HEMOLYMPH ACCLIMATION THERMAL
        HYSTERESIS PROTEIN WINTER HARDENING SEASONALITY
ORGN Classifier
          Insecta   75300
     Super Taxa
        Arthropoda; Invertebrata; Animalia
     Taxa Notes
        Animals, Arthropods, Insects, Invertebrates
ORGN Classifier
          Coleoptera   75304
     Super Taxa
          Insecta; Arthropoda; Invertebrata; Animalia
     Taxa Notes
        Animals, Arthropods, Insects, Invertebrates


=> d his

     (FILE 'HOME' ENTERED AT 09:46:05 ON 04 AUG 2004)
               SET COST OFF

     FILE 'HCAPLUS' ENTERED AT 09:46:16 ON 04 AUG 2004
L1             1 S (US20020173024 OR US20020172951)/PN OR (WO2001-US18532 OR US2
               E HORWATH K/AU
L2            14 S E3-E6
               E EASTON C/AU
L3            15 S E3,E14,E17
L4            26 S L2,L3
L5           197 S THERMAL (L) HYSTERESIS (L) ?PROTEIN?
L6            41 S THERMAL (L) HYSTERESIS (L) ?PEPTIDE?
L7          1071 S ANTIFREEZ? (L) ?PROTEIN?
L8           332 S ANTIFREEZ? (L) ?PEPTIDE?
               E THP
L9          5105 S E3
               E AFP
L10         3573 S E3
L11           30 S L9 AND THERMAL (L) HYSTERESIS
L12          350 S L10 AND ANTIFREEZ?
L13         1177 S L5-L8,L11,L12
               E HYSTERESIS/CT
               E E3+ALL
L14          272 S E1 (L) THERMAL
L15           31 S L14 AND (?PROTEIN? OR ?PEPTIDE?)
L16         1177 S L13,L15
               E ANTIFREEZE/CT
               E E5+ALL
L17          667 S E2
L18         1177 S L16,L17
               E ANTIFREEZE/CT
               E E3+ALL
L19           22 S E2,E3 (L) PROTEIN
L20            7 S E2,E3 (L) PEPTIDE
L21           11 S E2,E3 (L) ?PEPTIDE?
L22           41 S E2,E3 (L) ?PROTEIN?
L23         1177 S L18-L22
               E RECRYSTALLIZATION/CT
               E E3+ALL
L24        17276 S E5
               E E4+ALL
L25        76344 S E4
L26           17 S L23 AND L24
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L27          21 S L23 AND L25
L28         370 S L23 AND ?CRYS?
L29          73 S L23 AND ?RECRYS?
L30          88 S L26,L27,L29
L31         119 S L23 AND ?CRYO?
                E CRYOPRESERVATION/CT
                E E3+ALL
L32          27 S L23 AND E2
L33          66 S L23 AND (E3+OLD,NT,PFT,RT OR E4+OLD,NT,PFT,RT)
                E ICE/CT
L34           4 S E5 AND L23
                E E3+ALL
L35         132 S L23 AND E3,E2+OLD,NT,PFT
L36         223 S L23 AND (E8+OLD,NT,PFT,RT OR E9+OLD,NT,PFT,RT OR E10+OLD,NT,P
                E FREEZING POINT/CT
L37         118 S L23 AND (E3+OLD,NT,PFT,RT OR E4+OLD,NT,PFT,RT)
                E PRESERVATION/CT
                E E3+ALL
L38          55 S L23 AND E1+NT
L39         280 S L23 AND (E17+OLD,NT,PFT,RT OR E16+OLD,NT,PFT,RT OR E15+OLD,NT
L40         441 S L30-L39 AND (?PROTEIN? OR ?PEPTIDE?)
L41           9 S L30-L39 AND (PROTEIN? OR PEPTIDE?)/SC,SX
L42         441 S L40,L41
L43         141 S L42 AND SOLUTION
L44          10 S L4 AND L23
L45          10 S L4 AND L5-L23
L46          11 S L4 AND (?FREEZ? OR ?FROZ? OR ?CRYO? OR ?CRYS?)
L47          11 S L1,L44-L46
L48          10 S L47 AND (?PROTEIN? OR ?PEPTIDE?)
L49           1 S L47 AND (PROTEIN? OR PEPTIDE?)/SC,SX
L50          10 S L48,L49
L51           1 S L47 NOT L50
                E TENEBRIO/CT
L52         926 S E4+OLD,NT,PFT,RT
L53        1091 S E3+OLD,NT,PFT,RT
L54        1092 S E3-E7
                E E3+ALL
                E E6+ALL
L55        3162 S E6+NT
L56          32 S L23 AND L52-L55
L57          42 S L23 AND (TENEBRION? OR T MOLITOR OR TENEBRI? MOLITOR)
L58          12 S L42 AND L56,L57
L59           4 S L43 AND L50,L58
L60          21 S L1,L50,L58,L59
L61          29 S L56,L57 NOT L60
L62         476 S L42,L43,L60,L61
L63         476 S L62 AND L1-L62
L64         349 S L63 AND (PD<=20000608 OR PRD<=20000608 OR AD<=20000608)
L65         349 S L64 AND (?PROTEIN? OR ?PEPTIDE?)
L66           6 S L64 AND (PROTEIN? OR PEPTIDE?)/SC,SX
L67         109 S L65,L66 AND SOLUTION
L68         106 S L67 AND (ANTIFREEZ? OR RECRYSTAL?)
L69          48 S L68 AND (INHIBIT? OR PROTECT?)
L70          79 S L67 AND (PROTEIN# OR PEPTIDE# OR POLYPEPTIDE# OR GLYCOPEPTIDE
L71          37 S L69 AND L70
                SEL DN AN 14 26 35
L72          34 S L71 NOT E1-E9
L73          42 S L70 NOT L71
L74          30 S L73 AND ANTIFREEZE PROTEIN
L75          12 S L73 NOT L74
                SEL DN AN 1 2 3 5
L76           8 S L75 NOT E10-E21
L77          11 S L69 NOT L70-L76
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                SEL DN AN 1
L78           10 S L77 NOT E22-E24
L79           19 S L67,L68 NOT L69-L78
                SEL DN AN 13 17
L80           17 S L79 NOT E25-E30
L81           75 S L1,L50,L74,L76,L78,L80
L82           75 S L81 AND L1-L81
L83           75 S L82 AND (AFP? OR AFGP? OR THP? OR ANTIFREEZ? OR ANTI FREEZ? O
L84           45 S L82 AND ?CRYS?
L85           75 S L82 AND (HYPOTHER? OR ?PRESERV? OR ?PROTECT? OR INHIBIT? OR P
L86           75 S L82-L85
L87           38 S L56,L57 NOT L86
L88           24 S L87 AND (PD<=20000608 OR PRD<=20000608 OR AD<=20000608)
L89            0 S L87 AND L4
L90           99 S L86,L88
L91           14 S L87 NOT L90

     FILE 'HCAPLUS' ENTERED AT 10:34:01 ON 04 AUG 2004

     FILE 'BIOSIS' ENTERED AT 10:34:34 ON 04 AUG 2004
                E HORWATH K/AU
L92           29 S E3-E7
                E EASTON C/AU
L93           17 S E3,E6,E15,E18
L94           42 S L92,L93
                SEL DN AN 1 5 7 11 15 16 17 21 28 30 32 33 34 35 36 37 38 39 40
L95           19 S L94 AND E1-E53
L96           19 S L94 AND (?FREEZ? OR ?FROZ? OR COLD OR THERM?)
L97           19 S L95,L96
L98           28 S L94 AND INSECTA+NT/ORGN
L99           18 S L97 AND L98
L100          10 S L98,L98 NOT L99
L101          17 S L97 AND (?PROTEIN? OR ?PEPTIDE?)
L102          18 S L98 AND (?PROTEIN? OR ?PEPTIDE?)
L103          18 S L101,L102 AND L98
L104          24 S L94-L102 NOT L103
                SEL DN AN 1
L105           1 S L104 AND E54-E55
L106          19 S L103,L105
L107           8 S L106 NOT ARTICLE/DT
L108          11 S L106 NOT L107

     FILE 'BIOSIS' ENTERED AT 10:41:49 ON 04 AUG 2004

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